# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXV. No. 1665.] LONDON, APRIL 9, 1895. [47TH YEAR. PRICE 6d.



**JAMES OAKES & Co.,**
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works
(also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

**WOLSTON'S TORBAY PAINTS**
*Special Quotations to Gas Companies.*
**DARTMOUTH, DEVON.**

**Lanemark Coal Co.,**
LIMITED.
**LANEMARK CANNEL AND GAS COALS.**
*Quotations and Analysis on Application to*
**LANEMARK COLLIERY,**
NEW CUMNOCK, N.B.
Shipping Ports: All the principal Scotch Ports.

— ESTABLISHED 1830. —
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Manufacturers & Contractors.
THE ONLY MAKERS OF
**PATENT ANTIMONY PAINT,**
**Parker's Imperial Black Varnish,**
*Oxide Paints, Oils, and General Stores for Gas and Water Works.*
WORKS:
ORMSIDE STREET, OLD KENT ROAD,
LONDON.

**ROBERT MARSHALL,**
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.
*Prices and Analysis of all the Scotch Cannels on Application.*

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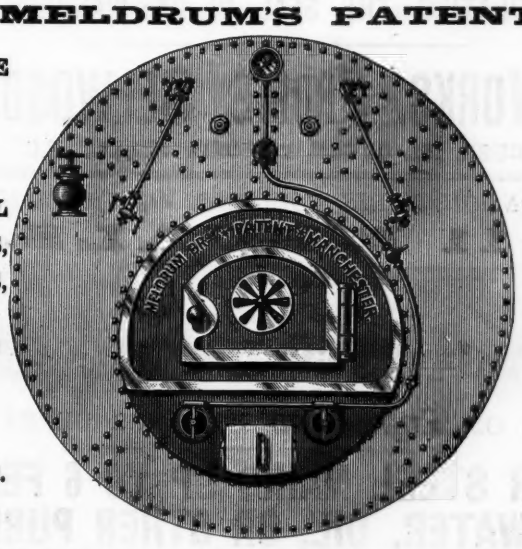
**"ABYSSINIAN" & ARTESIAN TUBE WELLS,**
FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
The following Town Water-Works Supplies have been obtained by this System, viz.:—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.
**LE GRAND & SUTCLIFF,**
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

# DUST-FUEL FURNACE
**(MELDRUM'S PATENT).**

**BURNS ANY KIND OF WASTE FUEL TO ADVANTAGE.**

**SUPPLIED to the PRINCIPAL GAS-WORKS, WATER-WORKS, ELECTRIC LIGHT STATIONS, &c., &c.**

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*Telegrams: "MELDRUM, MANCHESTER." National Telephone No. 1674.*

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(Successor to the late BENJ. WHITEHOUSE),

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(ESTABLISHED 1765),

## MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

*PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,*

**Wrought-Iron Roofs, Bridges, Girders, &c.,**

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DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

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THE IRON-WORKS, FROME.

Messrs. COCKEY desire to draw the attention of Gas Engineers and Managers to their new form of GAS WASHER, which, by a recent patent, converts their HORIZONTAL Washer into one of a VERTICAL form.

The principle is the same as in the horizontal one, which has now been before the profession for a number of years, and where adopted is giving unqualified satisfaction.

The Washer is entirely automatic in its action, and does not therefore need any motive power—an advantage which will be apparent to all.

It is made in all sizes, from 25,000 TO 3,000,000 FEET PER DAY; and Messrs. COCKEY invite inquiries, which shall have early attention.

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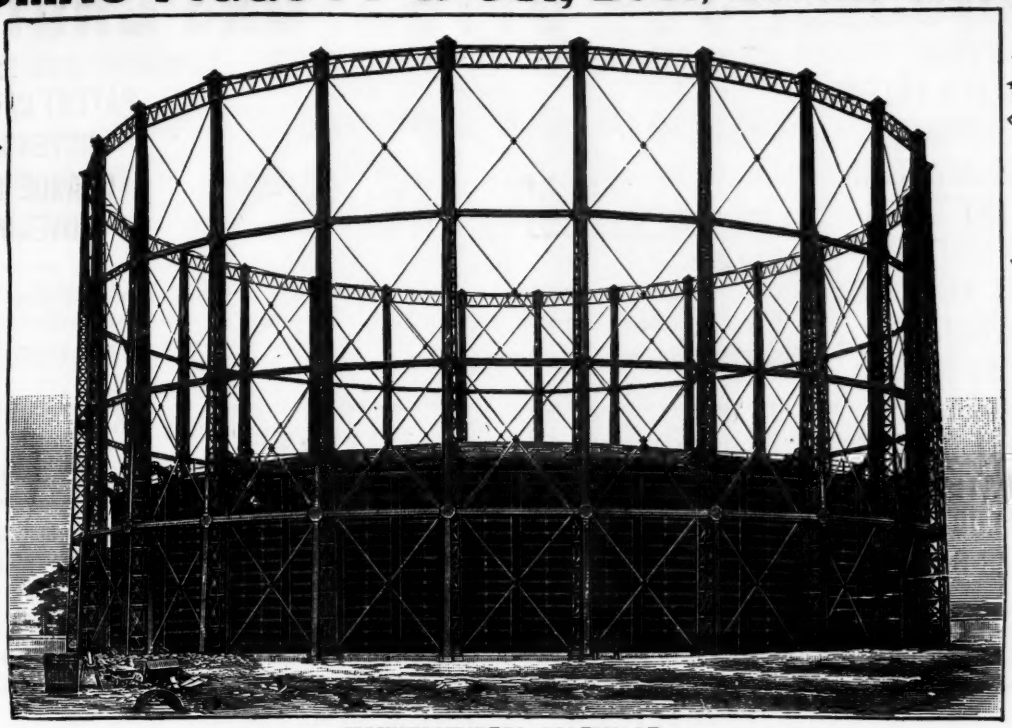

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—— *HAS ALREADY BEEN SUPPLIED TO GAS-WORKS AT* ——

COPENHAGEN, BRUSSELS, GLASGOW, BELFAST, LIVERPOOL, TOTTENHAM, and is in course of Erection now at BELFAST (Second Contract), SWANSEA, BRIGHTON, and PRESTON.

**Inquiries to be sent to the Patentees: 9, VICTORIA STREET, LONDON, S.W.**

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# GAS COAL.

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## REAL OLD SILKSTONE GAS COAL,

Address THE STRAFFORD COLLIERIES COMPANY,

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Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

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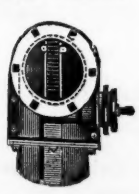
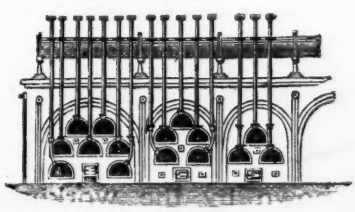
for working Purifiers,

Also Bye-Pass & Stop Valves.





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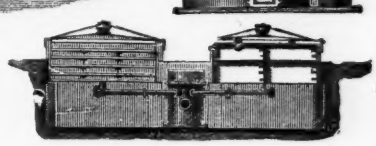


DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

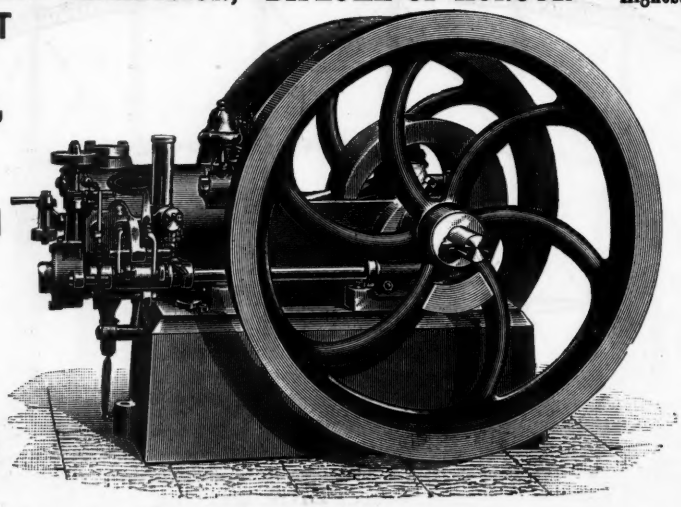
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

**GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.**

# CROSSLEY'S "OTTO" GAS-ENGINE.

CRYSTAL PALACE EXHIBITION, "DIPLOMA OF HONOUR"—Highest Award to Gas-Engines.

CROSSLEY'S PATENT OIL-ENGINES, PATENT STARTERS, PATENT TUBES FOR IGNITION, PATENT PENDULUM GOVERNORS, PATENT SAFETY HANDLES, PATENT TIMERS PATENT ANTI-FLUCTUATING GAS-BAGS.



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Every Engine thoroughly tested before being sent out

ALL PARTS MADE STRICTLY TO GAUGE.

GREAT REDUCTION IN PRICES.

OVER 800 ENGINES ALWAYS IN HAND.

*CROSSLEY'S NEW HIGH-SPEED ENGINE FOR DIRECT ELECTRIC LIGHTING.*

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MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

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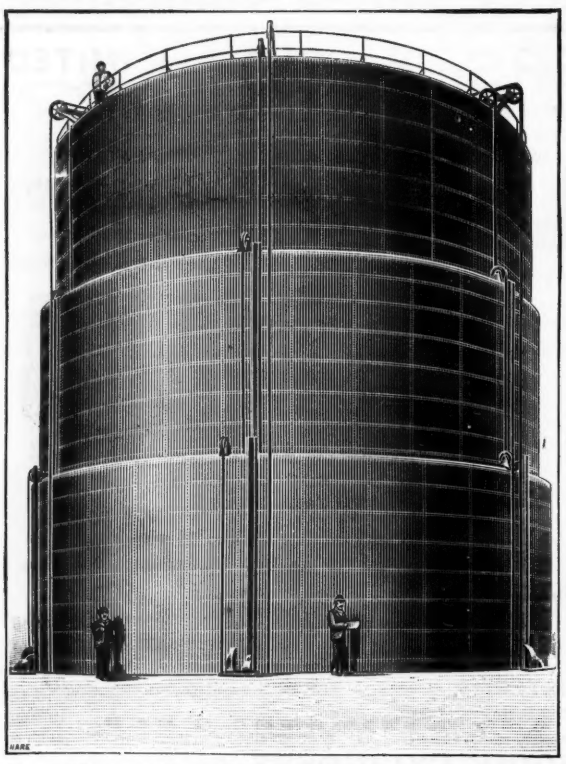
GAS-WORKS CONTRACTORS,

STOCKTON-ON-TEES.



From Photo. of Three-Lift Roped Holder, 50 feet diameter by 18 feet deep each Lift. Erected at Sligo, 1894.

## Pease's Patent Roped Gasholders

THESE HOLDERS HAVE WORKED SUCCESSFULLY UNDER EVERY TEST TO WHICH THEY HAVE BEEN SUBJECTED SINCE 1889.

MAY BE SEEN AT MANY PLACES.

*Send for Catalogue if requiring increased Storage.*

The security afforded by this System is shown by the working of the Three-Lift Holder, the subject of this engraving; not only was the Holder unaffected by the recent heavy gales, but also the recorded strain on the Ropes was remarkably small.

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Telegrams { "GASHOLDER, STOCKTON-ON-TEES." "APPARATUS, LONDON."

THE

# MAXIM PATENT CARBURETTOR

## FOR ENRICHING GAS IN BULK.

**Over 50 Maxim Patent Carburettors have now been fixed, capable of enriching**

# 650,000,000

CUBIC FEET OF GAS PER DAY.

Among the Companies supplied are The Gaslight and Coke Company, the South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **FOUR YEARS.**

More Gas and saleable Coke per ton of Coal Carbonized is produced; saving Capital Labour, Fuel, Wear and Tear, &c.

The Enrichment is **INSTANTANEOUS** and **PERMANENT.**

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

**SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.**

**FOR PRICES AND FULL PARTICULARS, APPLY TO**

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PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES,

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AND STEEL WORK

BRIDGES,

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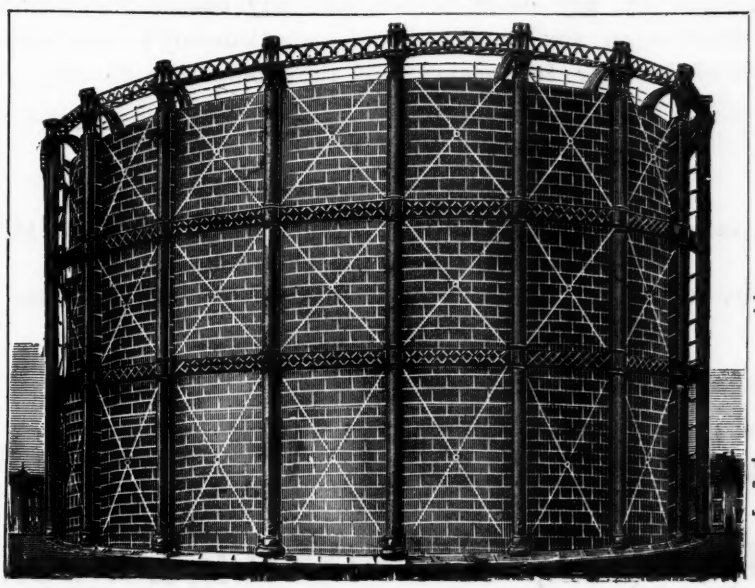

WORKS AND HEAD OFFICE:

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STAFFORDSHIRE.

LONDON OFFICE:

11, VICTORIA ST.

WESTMINSTER.

TELEGRAPHIC ADDRESSES:

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# INCANDESCENT GAS-LAMPS

Welsbach Patents.

## Great Reduction in Prices

## Due to Colossal Sales.

## Now supplied at 10/6 Complete.

### Important Notice.

Owing to the **unexpectedly large sales** of the Incandescent Gas-Light Burners, the Company are now in a position to offer these to the public at a **considerably Reduced Price**; thus bringing the unquestionable advantages of this System within the reach of the most moderate incomes.

At the higher price, we claimed with justice that the initial cost of the burner was covered by the saving in gas in twelve months, or less. We can, with equal justice, claim that at the **Reduced Price** this saving is effected in **eight months, or less.**

**THREE PATTERNS OF INCANDESCENT GAS-LIGHT BURNERS ARE NOW SUPPLIED.**

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| **The Ordinary "C" Burner . . . . .** | **Price 10s. 6d.** |
| **The "C" Bye-Pass Burner . . . . .** | **„ 12s. 6d.** |
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**Mantles will be supplied as heretofore at the reduced rate of 1s. 3d. for use with the Burner supplied by the Company.**

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The Mantles manufactured by the Incandescent Gas-Light Company can only (as provided by the terms of the limited licence granted with each Mantle) be lawfully used on Burners of the Company's own manufacture. Any person who sells one of the Company's Mantles with, or for use on, any other Burner, and any one of the public who uses one of the Company's Mantles on any Burner not of the Company's manufacture, will render himself liable to proceedings for **Infringement of the Company's Patents.** All persons are therefore warned against having anything to do with Burners not bearing the name of the Incandescent Gas-Light Company stamped upon them.

**The *Lancet* pronounces the Incandescent Gas-Light to be the HEALTHIEST, BEST, AND MOST ECONOMICAL SYSTEM OF GAS LIGHTING.**

**COPY OF FULL REPORT SENT GRATIS ON APPLICATION.**

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PURIFIERS with Planed Joints.

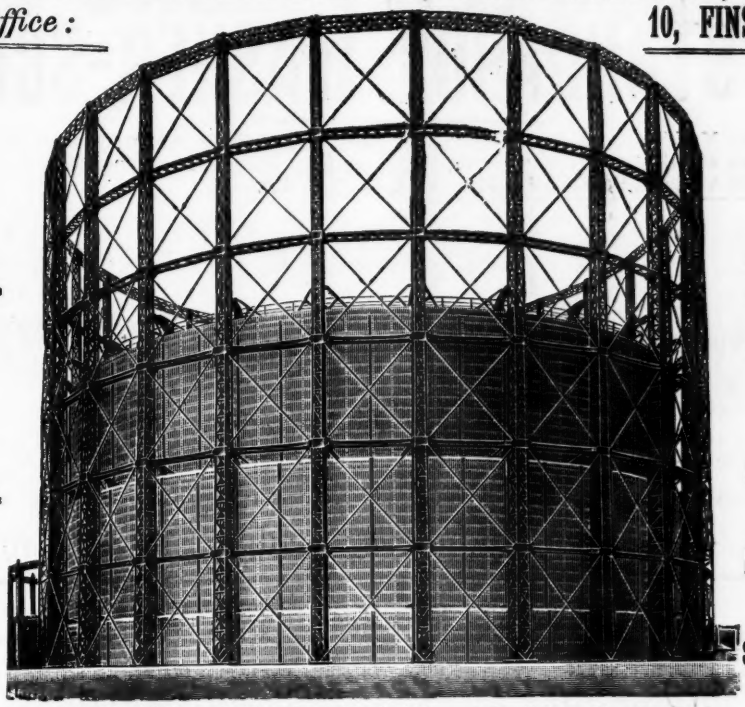
TOWER SCRUBBERS.

WECK'S PATENT CENTRE-VALVE.

CONDENSERS.

TAR PLANT.

SULPHATE OF AMMONIA PLANT.



Eight Million Cubic Feet Gasholder at Beckton, London.

WASHERS.

WASHER-SCRUBBERS.

CLAUS' SULPHUR-RECOVERY PLANT.

CENTRE & FOUR-WAY VALVES.

CRIPPS' HYDRAULIC MAIN VALVE.

RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES.

## WALKER'S PATENT PURIFYING-MACHINE.

# THE WHESSOE FOUNDRY CO., LTD., DARLINGTON.

**Established 1790.**

## MANUFACTURERS OF EVERY DESCRIPTION OF GAS PLANT,

FROM

# RETORTS

TO

# GASHOLDERS

FOR WHICH THEY HAVE THE NEWEST AND MOST MODERN MACHINERY.

GASHOLDERS CAN BE MADE OF ANY DIAMETER AND PUT TOGETHER AT THE WORKS.

Holders having a capacity of **8,000,000** Cubic Feet have been made and erected; the largest one being 191 feet diameter by 136 feet 9 inches deep. Riveted entirely with ⅞-inch diameter Hot Rivets.

WE ERECT GASHOLDERS EITHER WITH OR WITHOUT FRAMING.

NO ROYALTIES TO PAY FOR PATENTS.

SOLE MAKERS OF

## COATES' IMPROVED PATENT FURNACE DOOR PROTECTOR

Which has been approved and adopted by the Gas Authorities at

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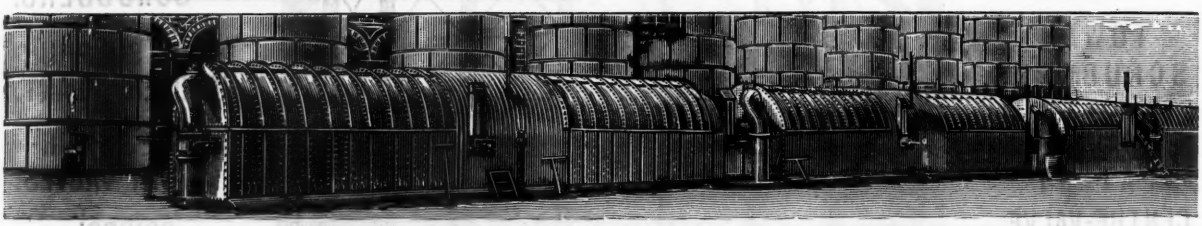
# KIRKHAM, HULETT, & CHANDLER, Ld.

## PATENT "STANDARD" WASHER-SCRUBBER

☛ **484** of these Machines (capable of dealing with **464,490,000** cubic feet of Gas daily) in use, which fact is given as evidence of this apparatus being the Most Efficient of any in the Market for the extraction of Ammonia, Carbonic Acid, and Sulphuretted Hydrogen from Coal Gas.



View of SIX PATENT "STANDARD" WASHER-SCRUBBERS, erected at the Beckton Station of The Gaslight and Coke Company (the Engines driving same being under Galvanized Iron Covers). This Company have 30 of these Machines in use. They are also in operation at a great number of Gas and other Works in this Country and Abroad.

**Sole Agents in Great Britain for Marshall's Patent Tar-Extractor.**

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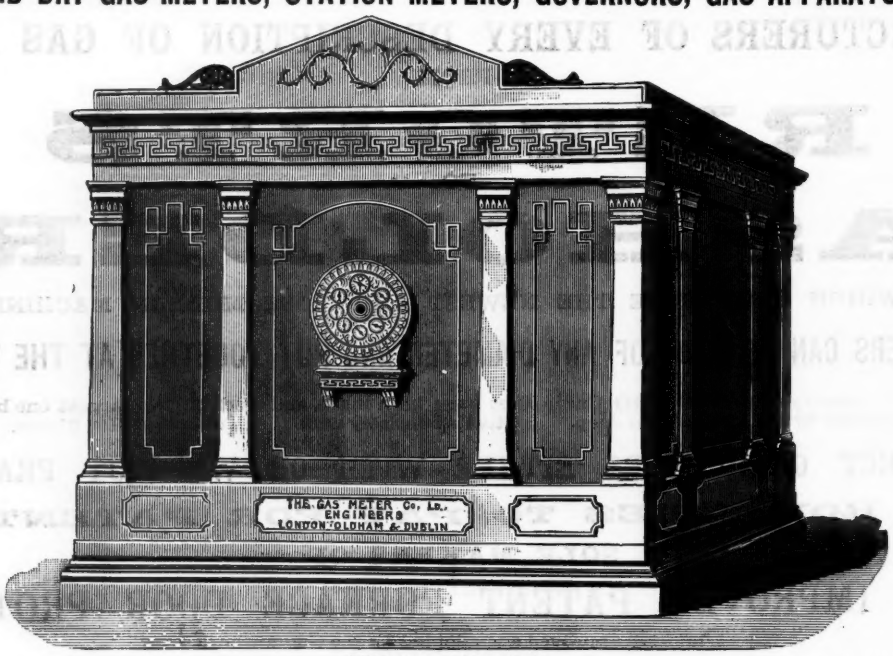
**WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.**

SQUARE STATION METERS WITH PLANED JOINTS.




STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM, Late WEST & GREGSON. Established 1830.

*For Prices and Particulars apply to*

**R. L. ANDREWS, General Manager.**

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Telegraphic Address: "METER."


[See Advertisement on back of Wrapper.

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Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

**Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.**

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*Furnish Plans, Estimates, and Specifications for* SINKING BOREHOLES *and* WELLS; *erecting* RESERVOIRS, FILTER-BEDS, *and* GASHOLDER TANKS; *and* EVERY REQUISITE *for* GAS *and* WATER WORKS,

INCLUDING

# MAIN LAYING

EXCHANGE TELEPHONE 1756.

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**Analysis: 12,600 feet of 19-candle gas per ton.**

**Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.**

*Telegrams: "ATLAS SHEFFIELD."*

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CUTLERS PATENT TUBULAR GAS CONDENSER SUITABLE FOR GASWORKS OF ALL SIZES, AND FOR ANY CLIMATE OVER 100 ERECTED

MAKERS OF GASHOLDERS OF EVERY SIZE AND TYPE

HUNT'S PATENT WASHER. IS THE ONLY APPARATUS NECESSARY BETWEEN THE CONDENSER & PURIFIERS. IT REQUIRES NO MOTIVE POWER

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FOREIGN AGENTS

AGENTS FOR THE "MAXIM" CARBURETTER, A MOST SUCCESSFUL ENRICHER. BY WHICH THE USE OF CANNEL COAL IS AVOIDED AND ALL TROUBLES WITH NAPHTHALENE OBVIATED

IMPROVED SYSTEM OF CARBURETTED WATER-GAS PLANT PARTICULARS ON APPLICATION.

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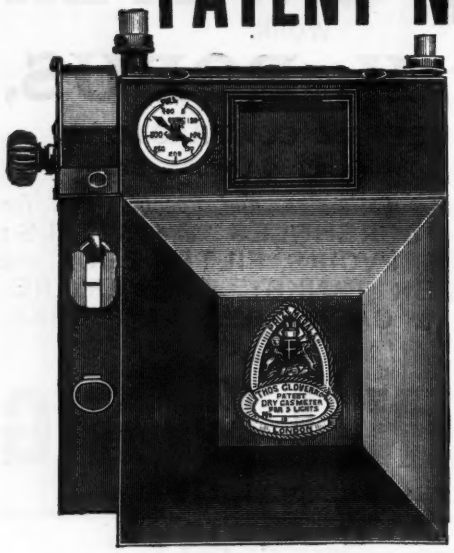
CUTLER'S FREEZING PREVENTER IS THE BEST APPLIANCE FOR PREVENTING FORMATION OF ICE IN GASHOLDER CUPS. IT IS IN USE AT MANY IMPORTANT WORKS IN ENGLAND, GERMANY, AUSTRIA, AND AMERICA.

ELECTRIC FITTINGS

DYNAMOS MOTORS.

# THOMAS GLOVER & CO.'S

## PATENT NEW IMPROVED PREPAYMENT METER



**For Pennies, Shillings, or any Coin.**

**Simple in Mechanism.**
**Positive in Results.**
**Price Changer** *in Situ.*

**GUARANTEED FOR FIVE YEARS.**

**Telegraphic Address: "GOTHIC LONDON." Telephone No. 6725.**

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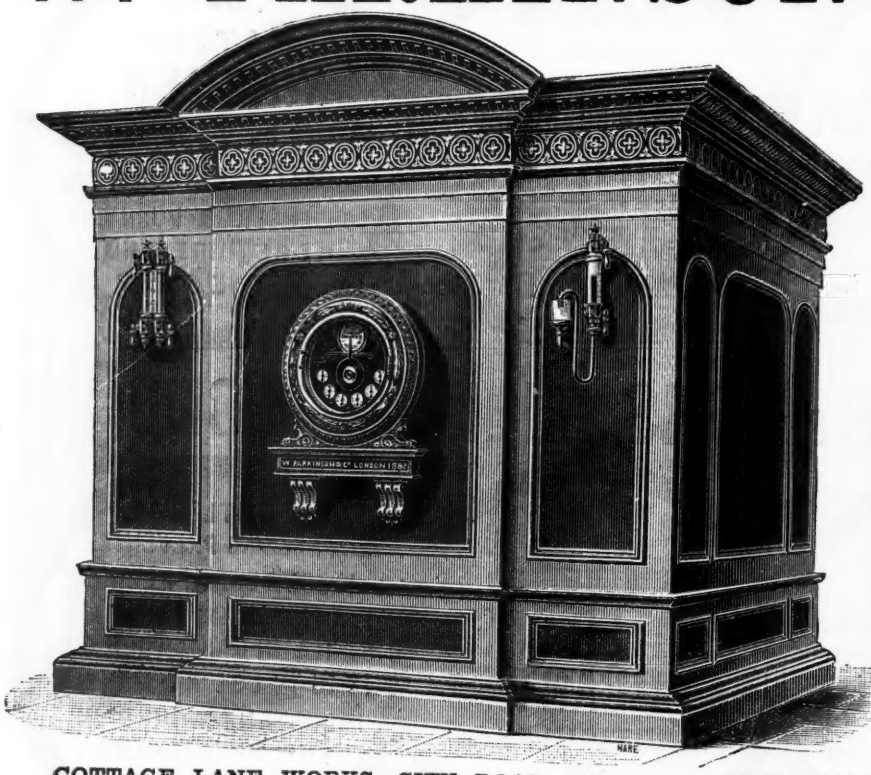

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## EASTER HOLIDAYS.

**Owing to the Easter Holidays, it will be necessary to go to press earlier than usual with the next number of the JOURNAL. We shall therefore be obliged by correspondents forwarding communications intended for that issue so as to reach us not later than FRIDAY, the 12th inst.**

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# EDITORIAL NOTES.

### Colonel Makins Unconvinced.

IT is with unfeigned pleasure that we acknowledge the receipt, from Madeira, of another letter by Colonel Makins, further setting forth his objections to Mr. Livesey's Workman-Director scheme. If the Governor of The Gaslight and Coke Company has been compelled to leave home on account of ill-health, we sincerely hope his change will have the effect of restoring his bodily vigour. His letter happily proves that he is not suffering from any falling off in controversial aptitude. As to the contents of this communication, they are, like a previous composition of his, divisible under two heads—one being composed of a reply to the JOURNAL, and another containing strictures on certain proceedings of Mr. Livesey—and again we shall confine our response entirely to the arguments directly addressed to us. Colonel Makins very fairly insists upon the importance of the initial objection which he has raised to the idea of doubling the parts of master and servant, director and directed; and he contends that nothing has yet been advanced in this controversy to remove it from his mind. We are not surprised at his taking this view of what has been said upon this point. We make no claim to having established to anyone's satisfaction the feasibility of the arrangement in question, and have no hope of being able to do so by the way of argument. It is, at present, purely a matter of opinion; and there does not exist any proof which could be adduced to clinch the argument on one side or the other. Colonel Makins objects to his view being called *a priori* reasoning; but we submit, with all respect, that there is no other correct term for it, in the absence of any experiment in point from the results of which an induction might be drawn. For that matter, the view taken by ourselves is likewise supportable only by purely *a priori* reasoning. Colonel Makins is of opinion that a certain proposed arrangement, which has never been tried, would not work. We, on the contrary, hold that there can be no harm in trying the experiment. Here is no question of safeguards, but of a fundamental difference of opinion regarding the practicability, under any conditions, of a certain scheme. It is impossible to reconcile differences of this nature without having recourse to a test, which apparently Colonel Makins will not countenance.

If we may be permitted to say it without offence, Colonel Makins's illustrations of *a priori* reasoning are wholly erroneous. There is nothing *a priori* in the statement that water will not run uphill, which is the baldest induction from perceptions of the influence of gravitation upon ponderable matter. If we carry the illustration a little further, however, and ask why, although it is observable that water will not run uphill, it will rise above its normal level under the operation of a pump-sucker, we shall be reminded of a fine old example of *a priori* reasoning which satisfied our ancestors for a considerable period of time. They said that the water followed the sucker because "Nature abhorred a vacuum," and asked no further questions. It is the habit of the natural man to satisfy his curiosity in this way; and all the progress that scientific man has made in the world, has originated in rebellion against the *a priori* conventions which buttressed beliefs and barred out knowledge. The other example mentioned by Colonel Makins is no assumption at all, but an axiomatic expression of quantity relations.

With regard to the attitude of the Chartered Directors, as indicated by the Governor, to profit-sharing in general and to the possible extension of the system to the employees of the Chartered undertaking in particular, we fear there is no other observation to be made so true as Mr. Livesey's declaration that the Governor does not understand it. Here again, it is not a question of comprehension of the details or conditions of a particular scheme, or of approbation of the South Metropolitan example and its developments, but of failure to grasp the fundamental principle. Colonel Makins is quite justified in protesting against what he seems to regard as our assertion that the Chartered Directors should force upon their employees a system of rewarding labour which neither party wants or believes in; only we said nothing of the kind. All that we contended for, and now repeat, is that it is the natural heads of an undertaking who should know best how and how much to pay for their labour; and we confess to holding the opinion that—whether it is a matter

of an advance of pay or the introduction of a new and presumably improved system of recompensing labour—it is much better for employers to act upon their own sense of what is fair and advantageous, than to wait to be asked. If the collective mind of the Chartered Directors is not drawn towards profit-sharing, it is better for them to leave it alone. As to being prepared to adopt the system if asked for it by their employees, it is sufficient comment upon this statement to remark that never in one single instance has profit-sharing been instituted in this way. It could not be done. Profit belongs to the employer, and to him alone. If he is disposed to give a proportion of it to his employees, it must be an addition to their normal rate of wages. This is another essential feature of profit-sharing that Colonel Makins expressly rejects; showing thereby that he does not realize the principle involved. At the risk of appearing a little tedious, we must endeavour to make this feature plainer.

The essence of profit-sharing is in this: An employer is making a certain average of net profit out of his business, after paying wages, working charges of all kinds, and interest on capital. Every penny of this profit is his—to dispose of absolutely in any manner he may see fit to practise. When, for any reason, he elects to go in for profit-sharing with his employees, what does this mean if it does not mean that he gives up a proportion of his profit to his workpeople, over and above their wages? Even if the object and effect of any scheme of the kind is to increase the average net profit of the concern, before division—so that the workpeople may be said to have made their share themselves—when they get it, it is still an addition to their wages. The real consideration for an employer in regard to the remuneration of his workpeople is, not so much what they individually earn, as what his labour costs him as an item of the total cost of production. There is an economical limit to the amount which an employer can afford to pay for his labour under any system, which limit is determined by the market value of the product. The same law applies to the advantage which a manufacturer is able to derive for himself from the use of improved machines and processes—it is limited by the price of the product in the market. In the gas industry, the influence of the market is exercised by the sliding-scale; so that in this industry also the cheaper the product can be made, the less value can be obtained for it. Apart from philanthropy, the only inducement to the adoption of profit-sharing by an employer of labour is the purely commercial one of getting better work done and saving the cost of strikes and other incidental expenses of discontented labour. But he dare not, by this or any other means, load his product with more than its due cost for labour. Short of this, he can do whatever he likes with the profit which is his. But it is for him to do it; and nobody else knows what are the limits within which he must act. It is pure irrelevance to talk in this connection about the Truck Act, which refers only to deductions from wages, not to increases upon them.

### The Commercial Company's Meeting.

THERE is very little to be said respecting the meeting of the Commercial Gas Company on Thursday. Mr. John Blacket Gill presided, and spoke pleasantly, as he always does, about the Company's doings and prospects, which appear to be exceptionally successful and happy. The offer of an additional half per cent. of dividend naturally made the proprietors comfortable; while the knowledge that this increased dividend was attended by a reduction in the price of gas to the consumers made them feel that they were being rewarded for being good, which is a very consolatory reflection. The proceedings scarcely held out to the end of the half hour, notwithstanding the inclusion of a speech by Mr. H. E. Jones, the Company's Engineer and General Manager, on the vexed question of the proportion of unaccounted-for gas, raised on this occasion, in the most amiable manner, by Mr. Besley, Q.C., speaking in his capacity as a shareholder of the Company. The question was rather too much for the Chairman; and so the Engineer took it up when his opportunity came. But he made little of it, beyond contending that the figure representing this, the most uncomfortable point of gas-supply statistics, is not a fixed quantity. Recent experiences have tended to make London gas managers more than usually sensitive upon this matter. Mr. Jones stated on Thursday, and reasonably, that the subject was altogether too large for him to go into at such a meeting, and before such an audience. He said he liked to talk to experts about it. If so, we shall be delighted to provide Mr. Jones, through the medium of our columns, with the audience he requires for an exposition of his views respecting a question which must always possess supreme interest for gas engineers, and never commanded more consideration than it does at the present time.

### The "Pall Mall Gazette" on London Gas.

A PERFECTLY nonsensical article on "The Problem of "London Gas" appeared in a recent issue of the *Pall Mall Gazette*. Fortunately the article, if stupid, was also short; so that it possessed the "soul of wit," if not its embodiment. This lucubration started with the asseveration that "the gaslight which lightens the Gentiles of the Metro-"polis is not matchless in its brilliancy." Apart from the vile taste of the allusive form of this sentence, it is utterly pointless. Why should London gas be matchless for brilliancy, any more than London beer be unequalled for potency, or London eggs be unparalleled for freshness? Then we are told that "without entering into photometrical "comparisons, it is reasonably evident that London gas at "its best is not of the quality which is the output of "provincial gas factories managed by Provincial Munici-"palities." How this can be said to be "reasonably "evident," without anything to prove it, is a mystery. A little farther on, however, we are told how people know about these things. "The citizen of a provincial town "may read, in his town's newspaper, periodical reports "as to the sperm candle power of his town's gas. He "knows his light is good; and it may or may not be an "added interest to know its photometrical virtues. But "the average Londoner knows his light is bad, and "certainly does not know much about the candle test." Here we have the whole art and mystery of gas-testing in a nutshell, according to this shining light of modern journalism. Either we know our gas is good, in which case photometry is unnecessary; or we know it to be bad, when, of course, photometry is equally superfluous. This kind of writing would almost persuade us that the "New "Woman" has irrupted into the *Pall Mall Gazette* office and driven the Editor out into the street, or nearly out of his senses. If it is not mere drivel, it is sad stuff to occupy space that might be better utilized. Curiously enough, the writer has a glimmering idea that London gas should show an illuminating power of "16½ candles" against the test candles, according to the prescription of the Gas Referees, whom he imagines to be officers appointed by the London County Council; and he does not go so far as to say that this obligation is not fulfilled. But he thinks there is somehow a good deal in the kind of candle employed in the testing; and he is not satisfied in his mind that it may not be in the power of the Gas Companies to get the Referees to let them off with poor candles, so saving many thousands of pounds. It is a painful suspicion; but there is a way of relieving it which might have occurred to the Editor of such an enterprising newspaper, if he had thought the matter over for a minute. Why not send and look up the Referees—thus getting the facts at first hand? A *Pall Mall* representative once penetrated into the interior of a Casual Ward in search of information; and it would be much easier for an emissary from Charing Cross Road to trace a Gas Referee to his modest rooms, and obtain from him some authentic statements respecting the illuminating power of London gas, and how it is ascertained and recorded in the interest of the public.

### The Commercial Gas Company and the Chief Gas Examiner.

THE action instituted by the Commercial Gas Company with reference to a certain report of the Chief Gas Examiner for the Metropolis (Dr. A. W. Williamson, F.R.S.) has terminated, as will be seen by the report which appears in another column, in favour of the Company. The Company took action by obtaining from the Court an order against the London County Council to show cause why a report of the Chief Gas Examiner, declaring that on a particular occasion there was a deficiency of illuminating power in the Company's gas, should not be brought into Court with the object of its being quashed. It was stated, on behalf of the Company, and not denied by the other side, that in this particular case Dr. Williamson based his judgment upon written and telegraphic statements respecting the candles used, obtained

from one side, without informing the Company. This amounted to receiving evidence in the absence of the Company; and all that Dr. Williamson could urge in excuse for the procedure was that it had always been his habit to obtain information as he wanted it from either party, without communicating with the other, of which both sides were aware. Doubtless this is so. But the custom was irregular; and the Court has condemned it, without, however, attaching any real blame to Dr. Williamson for having simply done once more what he had often done before without objection. Of course, the eternal candle question is at the bottom of the trouble; and when one cries "candles" in connection with a gas-testing difficulty, there is no need to explain the origin of any further unpleasantness. The case at the first glance puts Dr. Williamson in a light which cannot be esteemed favourable; but nobody for a moment suspects the veteran Chief Gas Examiner of a desire to act even unamiably, to say nothing of illegally, in the execution of a duty which the recent course of events has not rendered easier or more pleasant of execution. If the law is to be rigorously applied by one party, however, it is only to be expected that the other side will take advantage of whatever protection it may afford them.

### The Publication of New Legislation.

A MATTER of great public importance was briefly discussed in a leading article in last Friday's *Times*. This was the appointment, on the initiative of the Lord Chancellor, of a Joint Committee of both Houses of Parliament to consider in what manner the inconveniences arising from legislation by reference in Acts of Parliament to prior enactments may be avoided. It is to be hoped that something will come of the appointment of this Committee; for the evil complained of is a crying one. A modern Act of Parliament generally—one might say, with little risk of contradiction, invariably—contains a clause embodying some portion of an older Act, or providing that some other enactment shall not apply to the case in point, when it would be just as easy, and much clearer, to state fairly and openly what is or is not to be the law. So it has come to pass that, whenever an organic statute, like the Parish Councils Act or the Electric Lighting Act, is passed, employment is given to several painstaking gentlemen of the junior Bar in preparing an unabridged presentment of how the law actually stands, and what the new statute really means. And in this way confusion is worse confounded. Lord Salisbury has said of the Parish Councils Act that it is impossible of comprehension without having the "Statutes "at Large" at one's elbow. Of course, it is impossible to make any important addition to the statute-book without bringing into question many old Acts. But the point is that those who purchase an Act of Parliament which professes to contain the law of a certain matter, should be able to find in it all that they need know on the subject, and not be referred to other statutes which they do not possess, and perhaps cannot consult for further particulars which may or may not be of capital importance.

It is admitted by *The Times* that our statutes are in many respects much better pieces of workmanship than they once were, inasmuch as they are generally couched in ordinary language, and their meaning is not so often wrapped up in ponderous and interminable sentences. But in respect of frankness they are not so improved; for "a modern "statute will very likely contain a reference to perhaps a "score of unnamed statutes on the same subject, with the "necessary consequence that he who would know his "duties must consult a lawyer, and sometimes with the "consequence of leaving the Courts puzzled as to the "real intentions of Parliament." Of course, there are references which are both permissible and convenient, as when the provisions of a well-known statute are extended to cover a fresh need. But, as a rule, the practice complained of is due to nothing more than sheer laziness, or the desire to smuggle through Parliament measures which might arouse serious opposition if their full scope and tenor appeared on the surface. Reference is also made in *The Times* to the successful opposition by Sir Henry James (speaking, as it appears, as the mouthpiece of the General Council of the Bar) to the London Valuation and Assessment Bill, on the score of its being a private measure contemplating the repeal of no fewer than five Public Acts. The Council of the Bar rightly complain of this practice as highly inconvenient, and even dangerous. They have now offered a further suggestion of value, to the effect that the public should receive ample notice of any important changes effected by private statutes. Something of the kind is certainly desirable; for while promoters of Bills are required to give public notice of what they propose to do by statute, there are no regular means of acquainting people with what is actually done in this way.

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**Mr. A. P. Trotter** has resigned his position as Editor of the *Electrician*, in order to devote the whole of his time to his mechanical and electrical consulting practice.

**The Summer Instructions of the Metropolitan Gas Referees,** which have lately been issued, contain the usual intimation that the maximum amount of sulphur allowable in gas is 17 grains per 100 cubic feet.

**Mr. T. W. Tew, J.P.,** the Chairman of the Pontefract Gas Company, died last Friday week, at his residence Carleton Grange, near Pontefract. Had he lived till the 8th of May, Mr. Tew would have completed his 67th year.

**Mr. C. Power** has been appointed Secretary to the Water and Markets Committee of the Dublin Corporation, at a salary of £300 a year. Mr. Power has hitherto filled a subordinate position in the department; and the manner in which he has discharged his duties has gained for him the confidence of the members of the Committee.

**The Carlisle Appointment.**—The Carlisle City Council, at their meeting on Monday last week, unanimously adopted the recommendation of the Gas and Water Committee, and appointed Mr. C. B. Newton, of Rotherham, as the Gas and Water Engineer. Mr. Newton has been three years at Rotherham; having previously filled the position of Superintendent of the Effingham Street works of the Sheffield Gas Company. Prior to this he was at Shrewsbury, where, under Mr. W. Belton, he received his training. We heartily congratulate him.

**The Meeting of The Gas Institute in Edinburgh.**—The Council of the Incorporated Gas Institute held a meeting in the offices of the Edinburgh and Leith Gas Commission Friday last, to make arrangements for the annual meeting of the Institute, which takes place in Edinburgh on Tuesday, the 11th of June, and the three following days. Mr. R. Mitchell, Edinburgh, presided; and there was a full attendance. Reference to the matter will be found in our Scotch Correspondent's "Notes." The technical portion of the programme is not yet completed; but it is anticipated that there will be a very full list of papers.

**Presentation to Mr. A. Wharton.**—On Saturday, the 30th ult., an interesting ceremony took place at the Basford Gas-Works of the Nottingham Corporation, when most of the principal officials of the department, with a large number of the workmen met to signify their esteem for Mr. Arthur Wharton, the Assistant Superintendent, who was leaving to take the management of the Plymouth Gas-Works—an appointment which was noticed in our columns last week. The Corporation Gas Engineer (Mr. W. R. Chester, M.Inst.C.E.) made the presentation, which consisted of a beautiful timepiece, suitably inscribed, and a handsome electro-plated tea service for Mrs. Wharton. Mr. Chester, in the course of his remarks, said that while they regretted Mr. Wharton's departure, they could not but congratulate him on the appointment he had secured, which he looked upon as an honour, not only to himself, but to the town. He felt quite sure, from the exceptional training Mr. Wharton had had—having been born on the works, and resided there all his life—that he would creditably discharge the duties imposed upon him at Plymouth. Mr. Wharton gratefully acknowledged the kindness shown to him and his wife.

**The Disposal of the George Livesey Testimonial Fund.**—The opening of an addition to the free spaces of London last Saturday by Mr. Arthur Arnold, the Chairman of the London County Council, has a peculiar interest for the gas section of our readers. The new ground which has been given to the public for the purposes of health and recreation is situated on Telegraph Hill, Hatcham; and it has been secured through the initiative of Mr. George Livesey, who wished to devote to this purpose the money which he received as a testimonial after the great strike of the South Metropolitan gas workers. The fund amounted, with interest, to £1822; and this Mr. Livesey made up to £2000, and gave a drinking fountain besides. The Greenwich Board of Works voted a similar sum; the Haberdashers' Company, to whom the land belonged, on being approached, agreed to sell for £6000, though the land was valued at £8000—thus practically also contributing £2000; while the £2000 wanting to complete the purchase was voted by the County Council. In the course of the proceedings on Saturday, Mr. J. S. Fletcher, the Chairman of the Parks Committee, moved a vote of thanks to Mr. Livesey; and similar recognition was made of the generosity of the other donors. Mr. Arnold, in declaring the gardens open, said he had to acknowledge, with a deep sense of gratitude, the liberal spirit in which the funds for the acquisition of the land had been obtained; and he must congratulate Mr. Livesey on the munificent thought that led him to such an important and valuable conclusion. That gentleman had more than doubled the value of his testimonial by the noble and magnanimous use to which he had applied the money.

## WATER AND SANITARY AFFAIRS.

The London County Council having given special attention last Tuesday to the tramway question, it is understood that the *pièce de résistance* for to-day, apart from the "Budget," will consist of a debate on the Water Bills. A month ago, Mr. Benn gave notice of a motion for pressing forward, "with all possible speed," the County Council Bills for the purchase of the undertakings of the Lambeth and the Southwark and Vauxhall Water Companies. Notice of an amendment has been given by Sir John Lubbock, calling for a report as to the probable effect upon the rate, if the purchase of the undertakings is effected in the manner proposed in the Bills now before Parliament, having regard to the resolution of the Council with reference to the necessity for an additional source of supply, and on the basis of repayment in the maximum period of sixty years. As an addition to Sir J. Lubbock's amendment if carried, or to Mr. Benn's motion if the amendment is lost, Mr. Holland will move that the Water Committee should report as to the constitution and powers of a Water Authority for London, with a view to the incorporation in the Bills before Parliament, where practicable, of any decision which the Council may arrive at upon such report. It will be observed that Mr. Benn makes no reference to the six Water Bills of the Council which still await their second reading. We have previously remarked on the apparent design of the Council to get the two foremost Bills passed in the present year, but to allow the remaining six to slide over to another session. In frustration of any such design, we are glad to find Mr. George Banbury able to state, at the meeting of the East London Company last week, that it had been settled in the House of Commons for the remaining six Bills to be proceeded with, so that the two should not be used for the purpose of depreciating the value of the property appertaining to the other Companies. The two Bills were read a second time on the 22nd of February; and the six have been made to stand over until the 3rd of May—an unconscionable interval of ten weeks. In the meantime, the Council contemplate bringing forward a Public Bill, by which they will be enabled to make the repayment of capital in the purchase of the water undertakings extend over a period of a hundred years; thus enlarging the "maximum period" contemplated by Sir John Lubbock. If this arrangement is made to take the shape of equal annual payments, composed partly of interest and partly of capital, but always constituting the same total, the beginning of things will be made all the easier; but the burden of the obligation will be fully maintained to the end. Such a scheme provides a smooth path for extravagant finance; and it is one of the devices so popular with the Progressives, that we may expect to see it embodied in the Bill, which is to carry down the memory of the County Council to the verge of the year 2000. An important report from the Parliamentary Committee, on the subject of the Transfer Bills, comes before the Council to-day, proposing that the Corporation of the City should have, "in a complete water scheme in London, such share of "the management as is contained in the London Water "Bill of 1892." This would give the Corporation a representation on the future Water Committee to the extent of one-eighth of the total number of members.

We mentioned last week that more than forty petitions had been deposited in the House of Commons, by opponents praying to be heard against the Bill authorizing the transfer of the Lambeth Water Company's undertaking to the County Council. Within the allotted time, nearly as many petitions have been presented against the Bill for transferring the undertaking of the Southwark and Vauxhall Water Company. There is thus every prospect of a vigorous contest over the water question, ensuring the bringing forward of the many important points involved. Herein lies the real hope of the Water Companies. Mr. Banbury referred to the subject in his address as Chairman of the East London Company last Thursday; saying that while there was doubtless an eventful period before them, he thought the Companies had reason to hope for fair and equitable treatment when the terms of purchase came to be settled. They had to bear in mind that, whenever the Companies had a chance of fairly putting their case before a competent tribunal, "they "had always done well." This is the true state of the case. Opinions and prejudices find expression in the Press; but a Parliamentary Committee or a Royal Commission has to deal with facts. Mr. Banbury very wisely suggested that in an important inquiry such as the one about to be entered upon, involving such vast interests, the Committee "might adopt a line of action totally at variance "with that proposed by the London County Council." Encouragement is derived from the tone of the debates in Parliament; and Mr. Banbury entertains the hope that the Committee to whom the Transfer Bills are referred will "recommend a policy and scheme more statesman-"like, more workable, and more equitable than the crude, "immature, and unfair course advocated in the Bills" as they now stand. There is, however, the danger—if it may be called one—that if the Bills are made equitable, the County Council will disown them. And when we thus speak of the County Council, we are really speaking of the Progressive party, who have so thoroughly "jockeyed" the Council as to retain the old policy, though in its constitution is changed. Their ingenuity is shown in the case of the Thames Conservancy Board, on which the Progressives have just added two of their own party and one Moderate; thus leaving one Moderate to balance five Progressives.

In supposed accordance with section 9 of the Metropolis Water Act of 1852, the President of the Local Government Board has appointed Major-General A. de Courcy Scott to inquire into the complaints as to a deficiency in the water supply in consequence of the recent frost. General Scott opens the inquiry to-day at Wandsworth, when one of the complaints against the Lambeth Company will be investigated. *The Times* has made this movement on the part of Mr. Shaw Lefevre the occasion for a leading article, distinguished by its fairness and the cogency of its argument, and relieving the London Water Companies from a vast amount of unmerited blame. No remarkable results are predicted as likely to accrue from General Scott's inquiry; but the official procedure is approved, as having a tendency to satisfy the public mind and to promote improvement. While things were at their worst, *The Times* signifies that it was "almost useless to "attempt a dispassionate survey of the situation;" but now that the difficulties due to frozen pipes are fairly overcome, it is hoped that "something of the kind may "perhaps have become possible." It is accordingly pointed out that the recent frost was of a very exceptional character, absolutely unparalleled for forty years. In ordinary life, we do not provide for extreme cases as if they were usual; and we ought not to expect the Water Companies to act differently from ourselves. Thus we are told "it is idle to blame Water Com-"panies or anybody else for doing just what we all "do, and what we must do unless we are prepared to "double the cost and the worry of life." The mains had resisted the frost fairly well for a long series of years; and the average result was satisfactory. The people of London are also reminded that much of the outcry concerning the want of water has been due to defects with which the Companies have nothing to do. To guard against these defects, *The Times* proposes that the Companies should be made responsible for the pipes leading from the mains to the houses, so as to secure that they should be laid at a proper depth. It may be sufficient to say that the proposal comes a hundred years too late, and the only plan is to make the best of things as they are. The householder can sink his pipes lower if he likes, or may perhaps get his landlord to do it; but even then it is often needful to protect the pipes right up to the very point of discharge. As for the mains, *The Times* observes that to lower them everywhere would be extremely expensive and inconvenient, and in the majority of cases would not be necessary. Something is said in favour of a supply by meter, as a matter of policy, to mitigate complaints when the supply happens to fail. We need hardly say there are grave sanitary objections to any such method. At the close of the article, there comes a salutary caution, showing how the public "may well think that the little finger "of the County Council would be thicker than the loins "of any corporation amenable to Parliament and public "opinion." Neither can we forbear to mention how, in the recent crisis, the London Water Companies—perhaps not all in an equal degree—made such exemplary efforts to meet the emergency as merit recognition not likely to fall to their lot, though Mr. Banbury is able to state that the Company of which he is the Chairman have received some grateful acknowledgments.

# ESSAYS, COMMENTARIES, AND REVIEWS.

## GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 765.)

THE past week opened fairly well in most of the markets on the Stock Exchange, seeing what the close of the previous week was; and business was at first pretty good. Dulness, however, soon supervened, and the markets became much quieter. There was a tendency to realize profits wheresoever they could be espied, and a disposition to close down generally until Easter should be past and gone. Consequently the general aspect has not improved in brightness, and prices for the most part are in harmony. The Gas Market has participated to the extent of its full share in the general diminution of transactions, and some days were excessively devoid of interest. Changes in quotation, too, were more than usually infrequent and slight, the only conspicuous one being a material recovery in South Metropolitan "C" from the retrograde position which was somewhat hastily enforced upon it as soon as the Company's Bill had received its *quietus*. However, what few changes there are in Gas quotations are in the upward direction. In Gaslights, good steady business in the "A" saved the market from approximate stagnation. Prices held on so closely throughout the week, that transactions were marked every day at the level figure of 269. A fair amount was done, too, in the secured issues, all of which commanded nice figures; but the quotations did not move. There was also some business in the earlier portion of the week in South Metropolitans, which more than held their own, and showed how dangerous it would have been to have assumed that there was any real weakness in them when the Bill fell through. Nothing at all was marked in Commercials—being all buyers and no sellers. The brief and harmonious transactions at the Company's general meeting on Thursday evidenced the general satisfaction with the position of affairs; and holders do not seem to be rushing to sell out. The Suburban and Provincial Companies were almost stagnant, and quotations would not move. The Continentals were quiet and firm; the only change being an advance in Imperial Continental. The remoter undertakings did not present any feature. There was rather more doing in Water; changes in price being slight and irregular.

The daily operations were: Gas stocks were very quiet on Monday; and the only change was an advance of 2 in South Metropolitan "C." The good tendency was maintained on Tuesday—South Metropolitan "C" advancing 3; and Imperial Continental, 1½. Grand Junction Water fell 1. Wednesday was a rather quiet day, and nothing moved. Thursday's transactions in Gas were also limited and devoid of interest; but in Water there was a fall of 1 in Lambeth 10 per cents.; and 2 in the 7½ per cents.; but Southwark improved 1. On Friday, Gas was steady and unchanged; and Water stocks held their own. Saturday's business was unimportant, and the only change was a rise of 1 in West Middlesex.

## ELECTRIC LIGHTING MEMORANDA.

**The Brighton System of Charging for Electrical Supply—The Electrical Press on Major Cardew's Southwark Bridge Report—The Cost of Central Stations.**

A GOOD deal of notice is being taken, by those interested in the commercial success of central station electric lighting, in the device whereby it is alleged that the Corporation of Brighton have managed to secure an exceptionally large profit from the working of their electric lighting undertaking. The arrangement is the invention of Mr. Arthur Wright, the Electrician to the Corporation; and it may be shortly described as a sliding-scale of charges for the unit, designed to favour those consumers who use the light for the longest periods of the day—quite a different idea, be it noted, from the familiar plan of allowing discounts to consumers for the largest quarterly consumption. To encourage the class of consumers in question, who, for reasons that need not be explained, are the best customers of a central supply station, the Brighton practice is to charge after the rate of 7d. per unit for the first hour, and 3d. per unit afterwards. The effect of this concession is said to be that lamps are fixed where they are required for long periods of lighting, such as in passages and kitchens, whereas they were formerly restricted to shops and drawing-rooms and similar show places, which only require to be lighted perhaps for an hour or two a day on the average. In order to effectuate this method of charging, a supplemental time-measuring instrument has to be added to the usual meter; but this does not appear to be felt as an objection to the system, which has been copied for Bournemouth. It is reported also that some of the Metropolitan companies are contemplating its adoption. The idea appears to be a good one, having regard to the peculiar conditions of central station working, which make the cost of providing for what may be called the lighting-up current so heavy. It is, at any rate, far superior, as a popularizing device, to the practice favoured in some places of offering at half price a daylight and after-midnight supply, which very few consumers want.

It is gratifying to note that the electrical journals, in discussing Major Cardew's report on the Southwark Bridge culvert explosion, have dropped their originally favourite expedient of abusing the Gas Company, with the object of diverting public indignation from the electrical distribution plant. They were probably led to take up a more rational attitude in this regard by the consideration that on this occasion the Board of Trade Inspector exonerated the electric lighting cables from all suspicion of igniting the escaped gas, and confined himself to remarking upon the dangerous facilities presented by the culverts containing them for allowing explosive mixtures of escaped gas and air to travel and accumulate under long distances of street surface. One of the journals in question has got so far as to admit that, while it is of the highest importance to keep electric cable conduits clear of gas, it seems that the difficulties of doing so are comparable to those of a gas company in keeping gas in the pipes. This is a very fair way of looking at the matter. Be the conduits in roadways never so well made and tight, it is impossible to guarantee that they shall always and everywhere preserve their integrity; and be they never so well ventilated, this will not prevent their being occasionally transformed into enclosed pipes full of explosive mixture, in the event of a gas-main breaking in their vicinity. And nobody can say that gas-mains shall never break. It has even come to the same electrical journal asking whether culverts will not have to be abandoned, and electric lighting mains bedded solid in the ground, like the gas-pipes. This would be a terrible conclusion for the electric lighting interest, if it were to commend itself to the Board of Trade. Fortunately, for the present at least, the facts do not bear out such an extreme opinion. It is quite possible in most cases to so fill the conduits that they cannot accommodate any dangerous bulk of explosive mixture. The greatest objection to this proceeding will come from those connected with the low-tension system of supply, with its bare copper conductors. The City of London Company will have to be resigned to the filling up of those intended telephone-wire conduits by which they so cleverly incurred the hostility of the Corporation; and then there ought not to be much trouble. Where conduits can be solidly packed, it will be safer to do this than to rely upon artificial ventilation. We take the opportunity for reminding our electrical friends, *à propos* of street conduits generally, that the opinion of gas engineers has never been in favour of street subways, unless of considerable size, and capable of unquestionably efficient ventilation; and recent experience of the rabbit-holes made under the streets by electricians with small knowledge of the consequences likely to follow their action in this regard, has not tended to remove this objection. Gas engineers have always preferred to bury their mains in the solid ground; and it is more than a little hard to blame them exclusively, or even preferentially, for the results of the adoption of a different policy by electricians with nothing like their experience of the vicissitudes of distributing plant.

The actual capital cost of central electric lighting stations is not often easy to ascertain; but the fresh application of the Manchester Corporation for leave to borrow £100,000 for the purpose of extending their undertaking enables this figure to be obtained in regard to a very important example. The Corporation declare that they have actually spent £163,886 upon their undertaking, which comprises a generating site and buildings in the centre of the city, costing together nearly £69,000. The central station plant and machinery cost £35,566; and the mains, 61 miles in length, cost £48,505. Meters and electrical instruments came to about £6600; and the remainder went for engineers' fees and sundries. For this outlay, the Corporation secured a connection of 747 customers, consuming energy equal to the supply of 34,528 lamps of 16-candle power. This works out to a charge for capital of nearly £4 15s. per 16-candle lamp connected—not at all an excessive figure, and indeed low in comparison with many less fortunate undertakings of the same class. For the present year, the Corporation expect to be able to show a profit, after paying interest and sinking fund, of between £7000 and 8000. This is very good; but few places can boast of making so much out of electric lighting in so short a time. The experiences of the Burton Corporation are certainly of a different cast. Here, after spending £27,000, there is only £482 received for a year's supply; so that the unit, which brings in an average price of less than 6d., costs upwards of 1s. 7d. to produce. The cost to the ratepayers, by way of deficit, upon this piece of municipal enterprise is £1802 for ten months' working. And there are more places like Burton in the country than there are Manchesters.

**Resignation of Mr. T. Duxbury, of Darwen.**—At the meeting of the Darwen Town Council on Monday last week, the Town Clerk (Mr. C. Costeker) announced that a letter had been received from Mr. T. Duxbury, Assoc.M.Inst.C.E., resigning his appointment as Gas Engineer and Superintendent of the Fire Brigade. The letter was not read in open Council, but was submitted to the whole body in Committee. Mr. Duxbury stated that, after seventeen years' honourable service, it was due to the Council to express his sincere appreciation of, and gratitude for, the unvarying kindness and consideration he had received during that time at the hands of every member, with one or two signal exceptions, and to give the reasons for the step he had taken. This he did in detail. We understand that Mr. Duxbury was pressed to withdraw his resignation; but he felt that, in view of the causes which had led him to tender it, this was altogether out of the question. It was therefore accepted; and it was subsequently decided to advertise for a successor.

## REPORT OF THE ROYAL COMMISSION ON THE AGED POOR.

THE appearance of the report of the Royal Commission on the working of the poor-law system in regard to the aged poor comes as a further contribution towards the literature of a subject broached in the article entitled "Gas-Workers and Old-Age Pensions" which appeared in the JOURNAL for the 12th ult. It is a very elaborate and voluminous statement, bristling with statistics; but, while conveying a great mass of information, and many opinions bearing upon the subject of the reference, it does not contain a single suggestion capable of being worked upon constructively, with the object of removing a social condition which an awakened public conscience regards as a defect of our modern civilization. Yet it is not to be assumed from this that the labours of the Commission have been wholly futile and profitless. The investigation has done much towards discovering the facts of the matter to which it was addressed; and if, like the similar inquiry conducted by the Labour Commission, it fails to indicate any direction in which a radical departure from established practices may be hopefully taken, this is not an unmitigated shortcoming. Whatever else it may be good for, the report of the Commission, and the materials upon which it is based, will serve as the foundation of a vast deal of earnest further study of that problem which is always with us—the problem of the responsibility of the community as a whole towards its less fortunate and its worn-out members. We are all interested in this problem, in its existence, and in the prospects of its solution, which, however, are very dim and remote; for to escape from the fate of a poor old age is the main reason for our life-long individual exertions in the sphere of useful activity to which it has pleased Providence to call us, while to enable as many as possible to preserve themselves from the same fate is the chief object of all industrial and political economy.

This consideration leads up directly to one of the best features of the report. In contemplating the condition of old age and poverty to which unhappily so many of our working population appear to be doomed by a variety of causes, the Commissioners bring into prominence the consoling fact that the number of destitute persons, aged and otherwise, is diminishing in our community. In 1849, there were 6·27 per cent. of the total population of the British isles in receipt of relief; whereas in 1892 the proportion fell to 2·56 per cent. From 1862 to 1892—practically the period covered by the lifetime of a generation, as commonly reckoned—the ratio of aged and infirm poor fell from 1·96 to 1·20 per cent. of the population. This decrease has been steady and continuous; while the law under which relief has been administered has not been changed, either in the letter or in its agents. Hence it may be safely concluded that a good deal of old-age relief has been secured by natural means, through the growing thriftiness and increased prosperity of the community generally. The Commissioners, in fact, agree in the opinion expressed by Mr. Joseph Chamberlain, who stated that, "as regards the great bulk of the working classes, during their working lives they are fairly provident, fairly thrifty, fairly industrious, and fairly temperate." The Commissioners do not suggest that, in exercising the thrift necessary for a provision in old age, working men should lead penurious lives, or deprive themselves of reasonable comforts.

The circumstance that this actual improvement of the lot of the working classes has been coincident with the upheaval, professedly in their interest, of a vast amount of socialistic feeling, supported by the altogether baseless assertion that existing economical and social arrangements operate to "make the rich richer and the poor poorer," is only a further illustration of the truth of Herbert Spencer's profound observation that it is the things which are already on the mend that are popularly recognized as intolerable. The truth of the matter is that nobody complains of evils which are so general as to be unnoticeable, and so apparently permanent as to be accepted as inevitable. As with the drink evil, so with that of pauperism. It is after an improvement has actually set in, and a way out of the mischief not merely indicated but demonstrated to be practicable, that fanatics arise to demand that society should be turned upside down, and civilization shaken to its foundations, in order to dislodge what is being got rid of by natural and effectual, if slow, process.

It is also gratifying to learn, upon the authority of the Commissioners, that pauperism in the aged is not due, in anything like the degree that a certain order of social reformers have been accustomed to assert, to drink, idleness, improvidence, and the like causes. This is so of only a very small proportion of the aged poor who are inmates of workhouses. It is admitted also that a certain number of deserving aged poor are to be found in workhouses for reasons other than sickness or infirmity; but the general effect of the evidence taken by the Commission distinctly tends to the conclusion that they are few in number. Workhouse inmates generally are not fair samples of the working population. They are the failures, not necessarily all from vice, but from vice, slackness, want of backbone, which have in various degrees combined to make them the "hard bargains" of the industrial army.

The report has a good deal to say on the subject of the existing practice of relieving the aged poor by outdoor grants and doles, as to which we have no comment to offer. We certainly agree with the majority of the Commissioners in holding that, when relief is granted without the imposition of the "House" test, it should be a cardinal principle of such assistance that it should be sufficient. This is the rule of all pension and old-age funds established in connection with the gas industry; but it is far from being the case with regard to parish relief, which is usually limited to 2s. 6d. a week or so, and perhaps a dole of bread. When an old man or woman is in receipt of 10s. or 15s. a week, it is a competence; but the cost and the difficulty of making such provision for all aged paupers out of the rates would be enormous. Yet we are inclined to hope that, by the co-operation of the employers in the great national industries, much might be done in this direction.

The report of the majority is a series of "cold douches" for the amiable visionaries who permit their fancies to carry them off into all sorts of dreams respecting methods for alleviating the lot of the aged and deserving poor. Many such suggestions are given, only to be dismissed as objectionable or unworkable on one score or another; while at the same time the existing system is admitted to be unsatisfactory in precisely the respects to which the suggestions refer. Hence it is not to be wondered at that the Government and many other people are disappointed with the result of the inquiry—Government, because the report does not indicate any lines upon which legislation calculated to receive the support of the Labour vote might be instituted; and benevolent persons, because the report hardly assists anybody with a shilling to spare for the help of the poor in old age to see a way to its judicious employment for this purpose.

The report concludes with a detailed examination of Mr. Booth's scheme for state pensions for the aged, of Canon Blackley's scheme of compulsory insurance, and of Mr. Chamberlain's scheme, not one of which is held to be practicable. It is unnecessary for us to go into these matters in detail, especially as ten Commissioners refrain from offering any suggestion for making them, or anything of the same character, workable. One cannot help sympathizing with the five signatories of the minority report—Mr. Chamberlain, Mr. Ritchie, Sir H. Maxwell, Mr. W. A. Hunter, and Mr. Charles Booth—who declare the recommendations of the majority report inadequate, and falling short of what is warranted by the evidence before the Commission. They insist upon the point that the majority have not paid sufficient regard to the state of public opinion on the general question; and they emphasize the unsatisfactory fact that three out of seven of the population over 65 years of age, deducting the well-to-do population, are in receipt of poor relief, besides which there are large numbers of persons of the same age enduring great privations in order to keep off the rates. Stress is also laid upon the fact that old-age pauperism is not due to anything but old age, with its consequent infirmities; and the observation is made that "unless more respect is paid to the prevalent and well-founded sentiment in favour of some distinction between the aged who are brought to poverty by no fault of their own, and those who have become paupers through drunkenness, improvidence, and misconduct, the present agitation against the administration of the poor law may become irresistible, and lead to changes undesirable in the interests of economy and morality."

The minority blame the majority for inadequately dealing with all that portion of the remit which is concerned with the suggested substitutes for, or accessories to, the poor law. It is certainly remarkable that the efforts actually being made by employers of labour to help their aged workpeople to live without coming upon the rates, are not even cursorily mentioned in the report. The minority complain that their colleagues have been more apt at criticism than in construction, which is unquestionably true; but the circumstance is referable to the character and number of the Commissioners. There were too many of them, and they disagreed too strongly upon fundamental questions, to unite in any work of construction. Consequently, the minority suggest that the task of giving effect to the "widespread expectation that some other provision besides the poor law should be devised for the assistance of the aged and respectable poor," should be forthwith undertaken by Government, or confided to a special Commission less numerous than the old one, and better qualified to deal, in an impartial and scientific spirit, with the complicated technical details of the subject. Such a Commission might, with advantage, be composed of a statesman, a lawyer, a financier, an engineer, and a physician.

Meanwhile, what is the most obvious lesson of the reports, both of the majority and minority, of the Commission? That the difficulty of dealing with the complex subject of old-age poor relief as a whole drives us back to the position expounded in these columns in the article already referred to. Before the report of the Commission appeared, we remarked that human wit and capacity fail before the immensity and complexity of the problem as a whole; and we commended the policy of attacking it in detail, by beginning at the nearest side. These observations are abundantly justified by the report; and we trust that so far as the gas industry is concerned, the practicability of preserving good, honest workers from dying as paupers will be demonstrated before the world for the guidance of whomsoever may take up the task of formulating a constructive policy, which proved to be quite beyond the powers of the late

Commission. There is no mystery about this matter. It is done, and has been done for years, by many gas companies; but the duty should be recognized by many more. Let us hope the year will not be allowed to pass without establishing in proper form, and under authority, the right policy of gas manufacturers in this regard.

## TECHNICAL RECORD.

### INFORMAL MEETING OF SCOTTISH GAS MANAGERS.

The Twelfth Annual "Informal" Meeting of Scottish Gas Managers—convened, as usual, by Mr. James M'Gilchrist, of Dumbarton—was held on Wednesday last, in the North British Station Hotel, Glasgow.

#### Visit to the Tradeston Gas-Works.

The gentlemen who took part in the proceedings assembled about one o'clock, and drove to the Tradeston Gas-Works of the Glasgow Corporation. There they were met by Mr. W. Foulis, the Gas Engineer to the Corporation, and by Mr. John Wilson, the Manager of the works. The Tradeston works are very efficiently equipped with coal-breaking and mechanical stoking plant on the Arrol-Foulis system, all of which was described in the JOURNAL on the occasion of the "informal" meeting two years ago. The stoking machinery was shown at work; and it was noted that the drawing-machine dealt with a setting of eight retorts in six minutes, while the charging-machine required half a minute more to do a setting. One of the three continuous benches in the retort-house is now being rebuilt; and the series of ovens were shown in all stages of construction. The chief feature of the visit, however, was the preparatory work now in progress for the construction of a new gasholder upon a vacant piece of ground on the western side of the station. The holder is to be of 5 million cubic feet capacity. It is to be 220 feet in diameter, 45 feet in depth, and of three lifts. At present the workmen of Messrs. John Paterson and Son are engaged in excavating for the tank. The site was at one time a brickfield; and when the party were there, a bank of clay, which had been left where the engine-house stood, was being removed.

#### The Meeting.

Returning to the hotel, the chair was taken, at half-past three o'clock, by Mr. Alex. Yuill, Manager of the Alloa Corporation Gas-Works. There were about fifty gentlemen present, which was a fair average attendance.

The Chairman opened the proceedings by delivering the following address:—

Gentlemen,—My first duty to-day is to thank you for the honour you have conferred upon me by electing me Chairman of this year's informal meeting.

Since our last meeting, we have been reminded, on several occasions, of the spirit of evolution which permeates our profession, and makes us all feel that we require to keep our minds ever open, and ready to follow in the march of progress. I have always considered that our meeting together at this season of the year is advantageous to us all. With our reminiscences of the past year's working, together with its troubles and difficulties, with our imperfections and our successes not effaced from our memories, we are better able to give advice to, or take counsel with and assist each other, so as to make the "rough places plain."

As the Chairman's remarks at this meeting are generally taken as the *agenda* of the business to follow, I am desirous of placing before you those questions which more immediately affect us, instead of leading you through the ordinary routine from retort to consumer's meter.

At our last meeting, the Chairman (Mr. Thomas Wilson, of Coatbridge) dealt at some length with the miners' strike, which had taken place some time previously; but no one would then have dared to prophesy that within a few months we should be brought face to face with one of the greatest strikes that the Scotch miners have had in modern times. When we consider for a moment the destitution and privation that were caused, not only to the miners and their families, but to thousands who were thrown idle, and who were in no way responsible, we, as citizens, are apt to ask ourselves, Can nothing be done to prevent this widespread misery, which is correlative to all strikes? The time has now come for the history of that strike to be written; but I leave it to those better fitted, in the hope that means will be found to prevent a recurrence of what was attended with such momentous results. Let us hope that wiser counsels will prevail in the future with the miners and their employers, and that we shall not be called upon to narrate our experiences in maintaining the gas supply to our respective towns during a year similar to that which is past.

The reminiscences of the strike open up to us the question, How can we best protect ourselves from the vagaries of the miners, and consequently of the coal supplies? Ample coal storage has been considered the one essential. This is certainly what ought to be in any well-regulated works; but I am sure no manager escaped in the past year the unpleasant experience of finding his coal-stores empty, and therefore being compelled to meet his requirements where best he could.

The year has been a most eventful one. We had only recovered from the strike, and were busying ourselves with the heavy lighting season, when we were visited with an exceptionally severe frost, which, before its departure, gave us a taste of what we expect to find only in higher latitudes. I am sure none of us would have grumbled about the extra work involved, were it not for the difficulties we experienced with fractured pipes, causing great danger to life, and, in some cases, even the loss of life itself.

The question naturally arises, Is the severe frost the cause of the fractures? Some consider this the sole cause. In many cases it may be so; but I am of opinion that partial fractures or defective joints previously existed, though, from the open nature of the ground, any escape was better able to diffuse itself, and therefore did not make its presence felt. But when the whole earth was bound up, as it were, with a grip of iron, and coated with an impervious covering of ice, the escaping gas, not being able to find its usual channels, invariably found its way into defective services or into basements of buildings. It must not be forgotten, however, that, owing to the pipes obeying Nature's laws, new fractures were made, and those that previously existed were greatly enlarged.

Most of us have added to our experience in dealing with escapes during the past year; and it would be to the mutual advantage of all were we to exchange our opinions relative to our modes of procedure in dealing with the matter. At times, when the ground is free and open, the difficulties are somewhat lessened; but during the past winter, with the ground as hard and firm as cement, in searching for the source of leakage, when the escaping gas found its way through sewers and into buildings, the troubles and anxieties of those in charge were not inconsiderable. The form of procedure I adopt in searching for escapes is first of all to examine the tobeys in the vicinity, also the lamp-columns; and then I use the boring-rod along the track of the pipe, and also near the junction of the service-pipes with the main, for the purpose of localizing the leak. In some cases, where the gas finds its way into sewers, and makes its presence felt over a large area, the system of testing the main-pipe in sections, by the use of a meter and gas-bags, is to be recommended.

The many difficulties experienced in practical working, caused by the extremely low temperature, call for consideration. The freezing up of some of the apparatus, such as the water in the purifier lutes and the gasholder tanks, would naturally give trouble to those who had not a supply of steam at their command; but to those who had steam, no trouble need have been experienced if the steam were properly applied. The greatest difficulty met with in most works would be the maintenance of the illuminating power. With an ever-watchful eye on the temperature of the gas from the time it leaves the hydraulic main till it enters the purifiers, the manager will have reason to feel that he has prevented, as far as he is able, the deposition of the condensable hydrocarbons, which otherwise would have gone to the tar-well.

With the extremely low temperatures we have been experiencing lately, the gases from coal and shales—particularly the latter—continue to deposit the condensable hydrocarbons in the gasholder, distributing mains, and services; necessitating the use of an extra quantity of first-class coal to keep up the illuminating power. In speaking on this subject, I feel constrained to state that, during the time I have used oil for enriching purposes, no difficulty has been experienced in maintaining the illuminating power. Even last winter, when the temperature was 20° to 30° below freezing-point, no alteration was made in the proportion of oil gas to coal gas. The oil gas appeared to have the effect of rendering the coal gas more permanent. With steam at our command, we were able to keep the oil fluid, both in our storage and supply tanks.

The regenerative form of retort-settings are now being largely adopted in most works, in one form or another. I do not wish to particularize or recommend any form, as managers, individually, are the right judges of what is best suited for their works. It is possible that in the near future our attention may be drawn to the advisability of using either forced draught or induced draught in some form or another, so as to increase the efficiency of our producers and lessen the consumption of coke. In the present system of working, we use the rarefied air or gases in the chimney, as the motive power to pull the atmospheric air in through the furnaces for the primary combustion, and into the settings for the secondary combustion. It may have occurred to some that by using forced draught for primary and secondary combustion, and by regulating the damper openings to the chimney, to allow the products of combustion to escape, better results might be obtained. Some time ago, drawings were shown of a retort-setting designed for the purpose of utilizing a portion of the carbon dioxide ($CO_2$) before allowing the gases of the secondary combustion to escape to the main flue, by forcing the same in along with air for primary combustion, so that the carbon dioxide would become decomposed into carbonic oxide (CO) by passing through the incandescent carbon. But, so far, I have not been able to learn of its adoption in any works, so that reliable data could be obtained.

The problem which has received the attention of gas engineers during the past year has undoubtedly been that of enrichment.

The most recent contribution to that problem has been that of Professor Lewes;* and I am sure the scientific world, and the gas industry in particular, are very much indebted to the Professor for the clear and lucid manner in which he introduced the subject of gas enrichment by the use of calcium carbide for the generation of acetylene gas. We have not, as yet, got any reliable data regarding the cost of calcium carbide, and must therefore confine ourselves, in making comparisons, to the approximate cost, as given by Professor Lewes.

The relative value of any material used for enriching purposes is a ratio of the number of candles obtained for a given sum after the cost of manufacture has been added. But as we have no reliable data to go upon regarding the practical working of calcium carbide for the production of acetylene, I will content myself with dealing with the cost of materials. I have taken acetylene and oil gas for comparison.

| | Acetylene Gas. | Oil Gas. |
|---|---|---|
| Cost of materials per ton | £4 0 0 | £2 5 0 |
| Gas per ton | 11,000 cub. feet. | 22,500 cub. feet. |
| Illuminating power | 240 candles. | 95 candles. |
| Sperm value per ton | 9051 lbs. | 7328 lbs. |
| Cost per 1000 cubic feet | 7s. 3·27d. | 2s. 0·22d. |
| Candles per ton | 528,000 | 427,500 |
| Candles obtained for 1d. | 550 | 784 |

In the decomposition of the calcium carbide, the action is a very simple one, and may be termed, in chemical phraseology, "displacement." One ton of calcium carbide requires 11¼ cwt. of water to decompose and convert it into hydrate; and the result is 23⅛ cwt. of the hydrate, and 8⅛ cwt. of acetylene gas. The equation and combining weights are—

$$\underset{64}{CaC_2} + \underset{36}{2H_2O} = \underset{74}{CaOH_2O} + \underset{26}{C_2H_2}$$

Undoubtedly, one of the difficulties which would be experienced in using acetylene gas for enriching purposes would be its poisonous nature, which most of us have experienced with coal gas when a burner-flame fires back, or when a gas-fire does not burn properly; this gas being generated by the imperfect combustion of coal gas. Other objections are the explosive compounds which it forms with some metals, such as copper; and its explosibility by percussion. On the other hand, the pungent and obnoxious smell, which is so characteristic of the gas, may render escapes easier of discovery, and so allow of them being put right before much damage is done.

When this gas was first brought under my notice, I was naturally anxious to see how the new luminary would bear comparison with oil gas. Taking the figures for a mixture of coal and oil gas I gave last year (which I can now corroborate and confirm after the past year's working), and taking the figures given by Professor Lewes for acetylene gas, and calculating them with coal to give the same results in illuminating power, I find them to compare as under:—

| Acetylene Gas and Coal. | Oil Gas and Coal. |
|---|---|
| Calcium carbide . 5 per ct. | Oil . 7·5 per ct. |
| Coal . . . . 95 „ | Coal . 92·5 „ |
| Cost of— | Cost of— |
| Calcium carbide £4 10 0 | Oil . £2 5 0 |
| Coal . . . . 8s. p. ton. | Coal 8s. p. ton. |
| Gas per ton of combination. 9,385 cub. feet. | 10,312 cub. feet. |
| Illuminating power . . . 29·60 candles. | 29·51 candles. |
| Cost per 1000 cubic feet . . 1s. 2·83d. | 1s. 0·53d. |
| Sperm value per ton . . . 952·44 lbs. | 1043·33 lbs. |
| Sperm obtained for 1d. . . 6·84 „ | 8·06 „ |
| Candle-hours per ton . . 55,559 | 60,861 |

The values taken are—

| | Volume. | Illuminating Power. |
|---|---|---|
| Acetylene gas . . | 11,000 cubic feet. | 240·0 candles. |
| Oil „ . . | 22,500 „ | 95·0 „ |
| Coal „ . . | 9,300 „ | 16·5 „ |

I find that, for a make of 40,000,000 cubic feet, 2,350,000 cubic feet of acetylene gas would be required to combine with gas from common coal so as to give an illuminating power of 29·6 candles. This would require 213 tons of calcium carbide, and give 246 tons of calcium hydrate. The hydrate might possibly be used for purification purposes, after a little preparation. Supposing this to be so, how does the matter stand? We find, when dealing with the cost of materials, that oil and coal gas can be made at a cost of 2·3d. per 1000 cubic feet cheaper than gas from acetylene and coal. This on 40,000,000 cubic feet amounts to £388; being more than three times the sum necessary to purchase lime for the purification of the above quantity of gas. I consider that the cost of labour in working the apparatus for the evolution of acetylene gas would be much the same as with oil gas. I have taken no credit for the residual coke from oil, as this will compensate for the ordinary coke required for firing the oil-retorts.

In making these comparisons between the values of acetylene and oil gas as enriching agents, I have taken for granted that acetylene will give an enriching value at least equal to that which it gives when consumed alone. In reply to a question, bearing upon the enriching values, put by Mr. Lewis T. Wright, Professor Lewes stated that the enriching value of acetylene was considerably less than its value when burned by itself. My experience with oil gas would have led me to expect that the opposite would have been the case. It is possible, however, that by the decomposition of acetylene gas into other hydrocarbons, such as the benzol and olefiant groups, some means may yet be discovered of obtaining the full enriching value, provided the calcium carbide can be manufactured at a reasonable cost. It occurs to me that, as pure acetylene can be now be so readily prepared, it will form an excellent substance to employ as a standard for photometrical purposes.

In connection with the subject of enrichment, I cannot refrain from referring to the wonderful change that is taking place in the opinions of many of those interested in the gas industry in regard to the matter. Little more than twelve months ago, the experiment was made of supplying a part of London with low-grade gas, to prove that enrichment was unnecessary, and costs more than it is worth to the consumer; the object, apparently, being to pave the way for a Parliamentary Bill for a reduction of the illuminating standard of the gas supplied to London. And we had eminent engineers giving it as their opinion that low-grade gas was best and cheapest; and that to raise the candle power cost, for materials alone, 2d. to 3d. per candle, which was more than it was worth to the consumer. It was also said to be impossible to burn high-grade gas without causing smoke. It was even discovered that the illuminating power of high-grade gas was greatly inferior in illuminating effect to that of low-grade gas; and that, owing to the large area of the flame per unit of light of the low-grade gas, it, in some unaccountable way, gave an illuminating effect that could not be obtained from the smaller and more intense lighting flame of high-grade gas.

All this is now changed. We have eminent gas engineers who have had extended experience in supplying both low-grade and high-grade gas, strongly advocating the supply of the high-grade gas, not only for lighting, but also for heating, as enrichment can now be had for a little more than one-tenth the cost per candle of that stated as the cost a year ago. Oil-gas enrichment has worked wonders in changing the ideas of those holding the peculiar views regarding illuminating power and illuminating effect. We have them admiring and extolling the beauty, illuminating effect, and complete combustion of the small flame of acetylene, having an illuminating power of only 240 candles. Our worthy Convener, Mr. M'Gilchrist, has all along been a strong advocate of high-grade gas. I think we may now congratulate him that the gas world is being rapidly converted to his views.

The competition between gas and electricity as modes of lighting has had the effect of drawing more attention to the lighting value in candles per unit of volume, instead of the mere price per 1000 cubic feet, as previously; and, no doubt, this method of estimating the value of a gas has told in favour of high-grade gas. In the early history of the industry, gas was almost exclusively used for lighting purposes, and Parliament, when granting monopolies to companies or corporations, in fixing the standard, did so by reference to the illuminating power alone; and so long as gas was made by carbonizing coal, and used for such a purpose, the standard was sufficient. But since gas has come to be used so extensively for heating and motive power, it is important that its value for these purposes should be taken into consideration; and this is more particularly the case because of the great changes that have taken place in the manufacture of gas in recent years—such as carburetting with benzol, carburine, water gas, and oil gas, each of which has a value of its own, which causes considerable variations between the illuminating and the heating power.

With a view to ascertain the effect of enrichment by means of oil upon the relative lighting and heating values of oil-enriched coal gas, I have made the following calculations: The splint coal I am using gives a gas of about 16 candles per 5 cubic feet on the practical working, and has a heating power of (say) 650 heat-units per cubic foot. The oil gas has an enriching value of about 95 candles per 5 cubic feet, weighs 0·0746 lb. per cubic foot, and has a heating power of about 1648 units per cubic foot. To produce a gas of 30 candles requires 82 per cent. of coal gas and 18 per cent. of oil gas, by volume; and the mixed gas has a heating power of about 830 units per cubic foot. Therefore 1000 cubic feet will yield 6000 candle-hours and 830,000 heat units. We are selling such gas at 3s. per 1000 cubic feet. The consumer, therefore, receives 166·66 candle-hours for 1d., and 22,055 heat-units. To raise the 1000 cubic feet of the 16-candle gas to 30 candles by means of oil gas, costs us about 5·75d.; and therefore we could supply 16-candle gas at that amount less. But 1000 cubic feet of this lower-grade gas will only yield 3200 candle-hours and 650,000 heat-units; and with such gas, at 2s. 6d. per 1000 cubic feet, the consumer would only realize 106·66 instead of 166·66 candle-hours for 1d., and 21,666 instead of 23,055 units of heat—an increase of 56·34 per cent. in candle-hours and 6·41 per cent. in heat-units in favour of the higher-grade gas. In order to be able to compete with 30 candle gas at 3s. per 1000 cubic feet by supplying a 16-candle gas, the value to the consumer would require to be 19·53d. as an equivalent value for lighting purposes, and 28·19d. for heating and motive power.

I have gone more into the subject of enrichment by means of oil gas than I at first intended; but as this is a question on which I have had more experience than on that of enriching with water gas or carburetting with other volatile hydrocarbons, I was desirous of placing before you my ideas upon it, more from a consumer's point of view than from any other, as undoubtedly, to use a well-known phrase which is now identified with our worthy Convener, "We are selling light." Let that be our motto.

* See *ante*, p. 168.

In the discussion, in which I trust all will take part, we may also be enlightened, and stimulated to greater exertion, so that we may be better able to serve those whom we serve.

*Discussion.*

Mr. T. WILSON (Coatbridge), in opening the discussion, said the Chairman's address was a very instructive one. He would just like to put one question with regard to oil enrichment, and it was whether the Chairman found it more profitable than to enrich with shale or cannel. It was a simple question, and he thought it would be a very useful one. In Coatbridge, they had not tried oil. They were near the coal-fields, and had cheap shale. He supposed the Chairman was in the same position; and he might give them his experience, compared with previous years—whether it was cheaper or otherwise.

The CHAIRMAN replied that, if he were to answer the question in the negative, he would commit himself, because, when they considered the question of going in for oil, they considered it in all its bearings; and they found that that they could effect a saving of about 4d. per 1000 cubic feet. In Alloa, they were near the coal-fields; but they were not near the gas-coal fields. This was where their saving came in. In towns which were near the gas-coal fields, it was a different matter altogether. They were close to the common coal, which could be used when combined with oil. He found that, in comparing some of the works which were within reasonable distance, and where they supplied (say) 25-candle gas, and taking their figures for a full year's working with common coal, their cost, with gas of high illuminating power, made from common coal and oil, was nearly 1d. per 1000 cubic feet less. One thing must, however, be taken in connection with that—they must deal with the coal and oil gas, in the matter of cost, with coal gas of the same illuminating power. It was not right to compare it with a gas of (say) 30 candles. The question was how much would be the average cost of gas from coal and shale alone, of from 28 to 30 candles, as compared with gas from oil alone.

Mr. A. SMITH (Aberdeen) said he had worked out a considerable number of experiments in connection with the oil process; and there was no doubt that, if oil could have been obtained at 44s. per ton, with cannel at from 35s. to £2 per ton, they would in Aberdeen (where they were situated much about the same distance from the oil as from the coal) have effected a saving, if they had adopted the oil process, of about £8000 a year. But now, at present prices, if they were to adopt oil, he thought they would be losers by somewhere about £4000 to £5000. There was no doubt it was entirely a question of prices. He was afraid he could not recommend his friends to change the whole of their present apparatus to oil plant at once. It would be very well, perhaps, to have a few retorts to fall back upon if oil were to drop to the very low price at which it was for some time, but which, he thought, they would not care to see, because it meant ruin to the oil industry. He was afraid that, if cannel coal was going to be at a low figure, oil would not take the position which was represented by some of their friends. Taking a standard of 24-candle gas enriched with oil, working with splint, giving, perhaps, 14 to 16 candle gas, he thought they would find that he was not very far wrong. He therefore could not recommend oil. As to water gas, there was no doubt it was a very clever system; but it really would require to be considered well before they could recommend it to be adopted. He had been over a good part of the country, and had seen the process working in all its bearings; and they must not really take the fine reports that were got up, but must satisfy themselves thoroughly.

The CHAIRMAN asked if Mr. Smith would state the data in the comparisons. It was now recognized that, in the oil-gas process, they could depend upon getting from 22,000 to 23,000 cubic feet of gas per ton of an enriching value—he did not say of illuminating power—of about 95 candles.

Mr. SMITH said that was really about the quantity of gas which they obtained; but they never could get it above 45 to 50 candles of enriching value.

The CHAIRMAN said that with oil gas of 45 candles enriching value, it would never pay to work oil. He had worked with it since 1893. They had a public examiner, who tested the gas as he pleased; and in calculating up the results of his tests, they found they could depend upon getting an enriching value of about 95 candles.

Mr. W. CHALMERS (Alva) said the figures which were given by the Chairman were practically correct. They had worked the oil process about the same time as the Chairman; and they found that about one-seventh part of oil gave the enrichment he quoted. He could assure those present that, during the late frost, he did not alter the proportion.

The CHAIRMAN thought the better way to make a comparison was as they generally compared one coal with another—to take the sperm value, because there might be a difference in illuminating power and also in volume; but the sperm value being the mean of the two, they obtained a better average. He found that the sperm value of blue oil of ·845 specific gravity was 7329 (in his paper of last July, he gave it, in practical working, at 7328); blue oil of ·885 specific gravity, gave a sperm value of 6635; and splint coal, gave 1365. Those were the figures to take for making comparisons.

Mr. SMITH said that some of them were working under Act of Parliament, and had to supply a gas of (say) 20 or 25 candle power. The person who was appointed to test the gas would pass nothing else; and he could assure them that, if they took a standard quality of gas, the figures he had given were pretty correct—that, with the low price of cannel, at present oil had no position at all. He thought it would really pay their friends to go on with coal rather than to put up costly apparatus.

Mr. A. MACPHERSON (Kirkcaldy) thought they could all congratulate their Chairman upon his excellent address. First of all he spoke of the miners' strike, which was an experience he was sure no one would like to have repeated in a hurry. They all had had their difficulties. Oil might have been a benefit at that time if they had had, as Mr. Smith suggested, a few retorts standing by. But, as they all knew, their duty was to have as much coal storage as possible, so as to defeat any combination among the men. At the same time, however considerable their coal storage might be, every one of them must have suffered monetarily in this financial year, through the colliers' strike. They might take it for granted, he thought, that, but for the strike, their balances would have shown a considerable difference from what they would. It was said that "it never rained but it poured." After the strike, they had a frost; and he had heard some say they had never passed through such a winter. His own experience was normal; but those who had had abnormal experiences should state them. No doubt, as the Chairman had said, their leakage would be very considerably increased, from the effects of the frost, in causing drawn joints, and in a number of other ways. Like his friend Mr. Smith, he had not been able to see the advantage of oil enrichment. Of course, if cannel had remained at the very high price of from 30s. to 35s. per ton, oil would then have been of considerable advantage. The Chairman had said they must compare the same qualities of gas. That would be right; but he very adroitly took 29 to 30 candle gas, and compared that with gas from cannel. He did not think that was a very fair comparison. Very few companies or corporations cared to supply 29 to 30 candle gas; and they looked upon from 25 to 26 candles as a high grade gas. He did not see why, if 25 to 26 candles was amply sufficient, they should supply 29 to 30 candles simply to enable a favourable comparison to be made between oil-enriched gas and a high quality of gas produced from cannel. That was a point which, he thought, required to be looked to. Taking the sperm value in this way—suppose they supplied a 40-candle gas enriched by oil, and a 40-candle gas produced from a very superior cannel coal, no doubt they would then show a very great advantage in favour of oil-enriched gas; but he did not think this was the proper way to compare them. What he could not understand was how such an excellent and able engineer as they would all admit Mr. Smith, of Aberdeen, to be, could only get an enriching value of about 45 candles. He would like to see the discrepancy accounted for, because, if Mr. Smith could only produce the same volume and about half the enriching value that the Chairman could, there certainly must be some way of accounting for it. The Chairman had also referred to enrichment by acetylene. He supposed that it had scarcely assumed a practical form as yet; but it was possible that in the future they might look for a considerable benefit from that source. At least he was hopeful that calcium carbide would be produced by-and-bye so cheaply that they might draw upon it with advantage. He had heard of persons who were using the oil-gas process, and who were experiencing very considerable difficulties with it. He knew there were some of them in the room—he did not wish to name them—who had had those difficulties; and he would earnestly beseech them to tell them the nature of those difficulties, and how they had overcome them. The benefit to be derived from oil enrichment would no doubt be greater to those who were situated near splint-coal fields, and considerably removed from cannel fields. That went without saying; and in this way every man must judge for himself, according to his situation. So far as he was concerned, he had not yet seen his way to adopt the oil enrichment process; for the simple reason that he had not discovered where the benefit was to accrue to him.

The CHAIRMAN said that, instead of him replying to the questions raised by Mr. MacPherson, he thought it would be better that those who were working with oil should give them their experience; he did not wish to stand single-handed. No doubt most of them who worked the oil process had experienced difficulties in the working of coal gas. They must all admit that; and more especially in the introduction of some new thing. He could say frankly that he had had no more difficulties in the working of oil than in the working of coal. He also admitted that there had been works where there had been difficulties; but when they closely examined them, what were those difficulties? Were they difficulties created by an imperfect process, or by technical defects? In a great many cases, those difficulties were when the plant that was put down was inadequate for the proper working of the system, but were not of the system itself. Acetylene gas was outside the limits of practical application just now. He wanted to experiment with acetylene gas; and he wrote to Glasgow asking for a sample. He found that it was to cost him 140s. per ton. Mr. MacPherson had raised the question of enriching value. He admitted that it took more to enrich a gas from 16 to 30 candles than to enrich from 16 to 25 candles; but what he said was that they would enrich from 16 to 28 candles for the same cost as they would enrich from 16 to 25 candles. Therefore they were giving the consumer a

benefit of 3 candles; and they all knew that the higher they went in illuminating power, the greater the durability of the gas became. Therefore if they gave a gas of 28 candles for the same price as they gave a gas of 25 candles, the consumers obtained the benefit.

Mr. MacPherson: It costs you no more to enrich to 28 than to 25 candles?

The Chairman said that was so; they had been working the system, and had given their opinion that the enriching value of oil gas was 95 candles. They had the authority of Professor Lewes that the illuminating value of oil gas was 95 candles; and he did not think that anyone could say that 45 candles was what was to be realized.

Mr. MacPherson: Professor Lewes may have taken your figures.

Mr. T. Wilson: Our Chairman is making it with a known quality of coal gas; and he ought to know the value.

Mr. MacPherson: The question is why Mr. Smith only obtained 45 candles.

The Chairman: The enriching value is 95 candles; I can give my word for it. Let anyone take splint coal, giving 16 candles, and use 18 per cent. of oil gas; and I can safely say he will get 30 candles in the mixed gas.

Mr. MacPherson: Can you point out any likely way in which Mr. Smith only realized 45 candles? because we all admit Mr. Smith's ability to experiment with oil gas.

The Chairman: In a paper read by Mr. Glover, of St. Helens, at the meeting of The Gas Institute last year, I think it is within my remembrance that he also gave the enriching value as 95 candles; and that was working with a coal which gave less than 16 candles.

Mr. MacPherson: What I want to know is if you can tell us how it is that Mr. Smith only gets 45 candles.

The Chairman: I cannot.

Mr. J. B. Terrace (Brechin) said that, working with oil, he had at one time a very low stock of gas in the holders; and he used oil pretty freely. He could not say the exact quantity of oil; but he had it arranged so that he could use pure oil by itself or the black oil and the pure oil mixed. He had at the time sixteen retorts working with cannel and splint, giving, with oil, 24 to 25 candle gas. He was at his wits' end to get gas; and he put on an extra supply of oil, by which he produced gas up to 45 candles. He thought that Mr. Smith's statement must be a little out of the way. He did not know if he (Mr. Terrace) obtained 95 candles; but he was quite certain that he got a great deal more than 45 candles. He might be considered one of those who had had a deal of trouble with the oil-gas process. He was not saying there was anything wrong with the process. But perhaps he did not know the scientific way of working; and it was possible that he kept his heats too high. It was natural, when one wanted gas, to get up the heats. Perhaps the heats were too high; and they had choked ascension and cross pipes. If any of his friends should think that he was the one who had the greatest difficulty with oil gas, he believed they were correct. He had four oil-retorts. One of them gave way; and they did not observe it in time to shut off the oil. Instead of making gas, the oil ran into the oven, and caused such a great heat to the lower retort that the ascension-pipe choked; and then there was an accumulation of oil in the ascension-pipe. His workman went to the top of the bench to try to remedy it. When he put the poker down, the oil dropped into the retort; and it came up with a report like a cannon. The man did not sustain any serious injury; but he was ten weeks from his work. The process, in general, he believed, was good. He liked it as a stand-by; and he went into it partially the first winter, leaving himself free to judge whether he should have any more oil and any less coal. Although he had not yet had a year's experience of it, he quite believed that it would turn out very well. He would recommend it as a stand-by or auxiliary, to use, or to give up, as they pleased. He should like to ask the Chairman if he had not used tar with it. This was a matter well worthy of attention this season, when oil was likely to go up in price, whether they should not convert their tar into gas, and use cannel coal as formerly—utilizing the retorts they had for making oil gas and the apparatus connected with it for making tar gas.

Mr. A. Waddell (Broughty Ferry) thought there had been a little too much fear in regard to enrichment with oil gas. They had introduced it at Broughty Ferry, and at first they had a little preliminary trouble. This was not, however, owing in any way to the process, or the nature of the process. They were too anxious to get it started; and this was, for the most part, the cause of a little fire they had. But, apart from that, they had had no trouble; and, in fact, the process was quite as simple as making gas from coal. He was not one who, when he began to use the process, thought there was a great margin of profit in it; and he quite agreed with those who said that it depended a good deal upon the locality, and also upon the sale they could have for coke. They were pretty favourably situated for that; and, all taken into account, he considered that perhaps they were saving quite 1d. per 1000 cubic feet as compared with what they could do with (say) splint coal and shale. He had no reason to doubt the enrichment figures that had been adduced; and he was quite at a loss to understand how Mr. Smith had given it at 45 candles.

The Chairman: Would Mr. Waddell tell us if he determined what the enriching value of oil was when using a certain quantity of coal and oil?

Mr. Waddell: I can give you the exact number of tons of coal and oil; but I have not brought with me the illuminating power, though I should be pretty safe in saying that it has averaged from 27 to 28 candles—I believe nearer 28. We started oil enrichment at the beginning of November. We have used 1602 tons 14 cwt. of coal (Kelty nuts), the analysis of which by Dr. Wallace is 9600 cubic feet of 16-candle gas, or thereabouts. The oil used cost £375 (I have not the quantity), at £2 12s. per ton. The total cost for coal and oil was £1137 7s. 6d., less residuals £581 3s. 7d. The net cost was, therefore, £556 3s. 9d. for 17,240,000 cubic feet of gas. This was a net cost of about 7·73d. per 1000 feet for material to make (say) 28-candle gas. With regard to the cost of wages, I found that it was a little higher. You cannot make oil gas at the same rate per 1000 cubic feet for stokers' wages as coal gas. But the increase is very small; and I think we ought to congratulate ourselves on having taken up the process.

Mr. T. Wilson said the Chairman had stated that he could make 28-candle gas as cheaply as 25-candle. This was strange. Might he ask if 28 candles was the limit, and if it began to increase in price when they reached 28? He understood that gas from splint coal cost something like 4d. or 5d. per 1000 cubic feet; and oil gas, 1s. 11d. How, then, was it that they could produce 28-candle gas as cheaply as 25-candle?

The Chairman said he was placed in a somewhat invidious position, because he stood there as Chairman; but he thought he put it clearly before the meeting last year, that the higher they went in illuminating power, when enriching by oil, the less was the cost per candle.

Mr. T. Wilson: Does it stop at 28 candles?

The Chairman: No; we can go any distance. There is a misunderstanding. What Mr. Wilson asks, I take it, is, whether we can make 28-candle gas with oil as cheaply as we could make 25-candle gas before from coal and shale.

Mr. T. Wilson: No. My question was whether you could make 28-candle gas as cheaply from coal and oil as 25-candle gas from coal; and you said you could.

Mr. A. Wilson (Dawsholm) thought the question was a little misunderstood. The Chairman's statement was that he could make 28-candle gas as cheaply per candle as 25-candle. He (Mr. Wilson) did not think the Chairman intended them to understand that 28-candle gas was no dearer than 25-candle, because the generally accepted fact was that the higher the candle power they gave, in making gas from coal, the cost was more per candle; but the Chairman's figures last year, he thought, led them to understand that from 25 candles upwards it was the other way, and that they made it cheaper per candle. He did not think they could get 28-candle gas as cheaply as 25-candle gas. He thought that one of the questions which arose during the coal strike was what they would do if they ran short of coal altogether. The English coal-fields gave them a different quality of coal from their own; and the question cropped up with some of them whether they could use English coal in the same way as they could use Scotch coal. Scotch coal was usually easier to carbonize than English coal; and in the South it was generally accepted that five or six hours at the least were required for this operation. They found that they could carbonize English coal with three-hour charges—in the same way as the Scotch coal—and they obtained very good results from it. The fact of knowing this, took away a lot of the sting of the strike, as they could import English coal; and if they had oil-gas plant at hand, to give enrichment, he did not think they need be quite so frightened at a strike in future. The enrichment question again seemed to be the leading topic of the day. From the experiences given them from different quarters, he had no doubt they could get upwards of 90 candles of enrichment. He did not think that anyone who had had to do with oil gas could doubt that they obtained from the Peebles system more than 90 candles. Perhaps Mr. Smith had made a slight mistake in that way.

Mr. A. MacPherson: Excuse me; I have been told, since I spoke, that Mr. Smith was not working on the Peebles system; and, of course, that makes all the difference.

Mr. A. Wilson: I was going to say that, because, testing the Peebles oil gas on the photometer, we only get from 60 to 65 candles. It is only when mixed with poorer gas that you get the enrichment value. The same thing seemed to hold good with the oil gas they made with carburetted water gas. If they tested carburetted water gas on the bar photometer by itself, and then mixed it with a proportion of lower quality coal gas, they got a higher enrichment value, in the same way as with the Peebles process. This was due, no doubt, to their not being able to burn the high-quality gas to the full advantage. In keeping works going during cold weather, they had a great many things to look after; and the temperature was among the chief difficulties. One of the means they took to keep up the temperature in the purifiers was to introduce steam into the lutes, by itself. This certainly helped them; but they found that they obtained greater advantage if they used it with a water-heater or water-lifter, which gave them both heat and circulation. The Chairman spoke about leakages and breakages in the streets. This was not much in his department, as he was mainly a gas maker, not a gas distributor; but perhaps some of them would have

noticed, in times of very heavy frost, that a roadway would actually travel. If one side of a road were fixed against a kerb, and the other were free, they would see it travel, and, it might be, lift; and he believed that a great many of the breakages in pipes were due to the expansion by the frost. The Chairman had remarked about the loss of life in some cases. He supposed this was brought to his recollection by some of the fatalities in Glasgow. He knew it was currently reported at the time that many of these cases were due to water gas. He could assure them that water gas had little or nothing to do with the matter. The small quantity of water gas they made, in proportion to the coal gas, scarcely altered the composition of the gas. It only increased by a very little the quantity of carbonic oxide; and a great many of the fatalities occurred in districts where they did not supply water gas at all. With regard to oil gas, he thought there was a point that was not generally given full credit to. If they did not have the oil gas, they would certainly have to pay very much more for their shales and cannels. If they had oil gas, it would keep down the price of coal; and he thought they owed the oil enrichment people something for keeping down coal prices.

Mr. J. M'Crae (Dundee) said he had had a very severe winter in the matter of breakages; and in nearly all cases they were quite fresh. As to enrichment, he would like to ask the Chairman—it was quite refreshing to criticize their Chairman in the way they were doing, because he could meet them at all points—what benefit it was to the consumer. Had he been able to reduce the price of his gas since he introduced the oil process, and to what extent; and was the reduction entirely due to the oil process? Because, after all, the consumer wanted something substantial—he wanted relief in the price of his gas. Of course, they might give more light; but the average gas consumer wanted to have less money to pay. An instance came to his own observation, in connection with an incandescent gas-burner. The people said the light was exactly what they wanted, because their gas bills would now be something less than half what they had been. But they found that their bills were really very much the same. He wanted to know, given a gas-works of the same size as Alloa, with modern plant, and under the same shrewd kind of management as at Alloa—where the one had not the oil process and Alloa had—the difference in price in those two works, and if the difference was entirely due to the introduction of oil or the increased energy of the Alloa Gas Manager. He had no doubt that all these theories, results, and experiments might be correct; but the meeting could not be expected to criticize them at a moment's notice. He should like to have the matter reduced to pounds, shillings, and pence. The Chairman said that "the oil gas appeared to have the effect of rendering the coal gas more permanent." He (Mr. M'Crae) would like to know upon what basis that statement was established—what had he put into the coal gas to make it more permanent? Because, if what he put into it rendered it more permanent, it surely followed that, if they were to use nothing but oil gas, it would be perfectly permanent. Taking his own case, he supplied gas to consumers in places something like six miles from the gas-works. Their leakage was not very high—only about 8 per cent. Supposing they were to adopt the oil process, he would like to know if, upon their whole manufacture, to pass through about 200 miles, the leakage would be increased or reduced as compared with gas from coal without oil. It was not enough to plunge their condenser in ice, because they had no friction there. If he had some real guarantee that an improvement would result from the introduction of the oil process, it would be done; but until he had some figures to go upon—figures to lay before his people, and ask them to face an expenditure of about £5000 upon—he was not prepared to do it. They all knew that Mr. Smith was not in the habit of speaking just for the sake of doing so; and any statement he might make was about certain to be correct. If the thing were so manifest as their Chairman had told them, he thought it would be very hard indeed to find any engineer of experience who would dare to say "There's nothing in it;" and a great many engineers said that. He would like to ask if every gas company or corporation who had introduced that process had found the improvement and economy of which the Chairman had spoken. He wanted to know the *pros* and *cons*. They had the *pros;* but were there no *cons.?* They were all at one in regard to the process, in that they certainly could not expect its universal introduction; and he thought this was quite right. No doubt it depended very greatly upon the location of the works. If they could buy cannel at a low price, it did away with enrichment by oil. But he thought the matter should be thoroughly thrashed out; and it would be a good idea to have another meeting shortly, with Mr. Yuill in the chair, to consider it.

Mr. A. Waddell assured the meeting that he had told them all he knew about the process.

Mr. J. M'Gilchrist (Dumbarton) said the burning question with them was oil gas *versus* coal gas. He did not think the Peebles process could be the same in every works. They had had patents which, if introduced into certain places, were well spoken of, while in other places this was not so. The fault might lie in the working of it. Mr. MacPherson had explained the difference between the Peebles process and that adopted by Mr. Smith. There were several oil processes, one of which he (Mr. M'Gilchrist) had tested; and nobody who had any knowledge of it, would ever dream of employing it. If Mr. Smith had been using that process, he (Mr. M'Gilchrist) could not be astonished at the results he had obtained. There was, to his mind, a little misconception between several of the speakers with regard to the Chairman's statement regarding the 25 and 28 candle gas. He thought the Chairman very clearly made it apparent that it was coal gas, and coal gas alone, that he was referring to in the 25-candle gas, and that when he introduced the oil and the splint coal, he could get 28-candle gas at the same cost as 25-candle; and they knew that 3 candles was a great improvement upon any quality of gas. While the oil process might not apply to works that were situated within the district of cannel-fields, there was one thing they might hold, and that was that in districts, particularly in England, where they had very little cannel coal of high quality, the oil process must be a great boon, because it would enable those whose works were situated where they had a long carriage upon good coal to produce gas of better quality at a cheaper rate.

The Chairman said Mr. M'Gilchrist had had the tendency, in his remarks, to make the rough places plainer. As to Mr M'Crae's questions, the price of gas in Alloa, before the introduction of the oil process, was 3s. 4d. per 1000 cubic feet, with meter-rents. Last year they reduced it to 3s., and they took off meter-rents; so that, practically, the consumers were now paying 5½d. per 1000 cubic feet less, and were getting gas of increased illuminating power. He did not wish to make comparisons with other towns; but, in his opinion, comparison in price was not a fair criterion, because the question of interest upon loans came in in some cases. Mr. M'Crae also spoke about the figures he (the Chairman) gave. Some of those present would remember that at the meeting last year their friend Mr. T. Whimster, of Perth, whom he looked upon as in every way trustworthy, stated that in all particulars he could corroborate what he (the Chairman) had said.

Mr. W. Hamilton (Kilsyth) said they had had the process before them for two years, and they were still in doubt. Would they recommend the adoption of the oil process in any works producing (say) 8 million cubic feet of gas a year? He was at Peebles with his Commissioners; and they were making gas cheaper than they were doing there.

The Chairman said they must clearly understand that he did not stand there as an agent for the Peebles process; he stood on his own merits. He would refer Mr. Hamilton to some works about the same size as his own, such as Alva and Tillicoultry, where the process was being worked, and the managers of which, he was sure, would be pleased to give him all the information they could.

Mr. J. Renfrew (Langbank) asked if anyone could tell him whether paraffin oil would have any effect in preventing water freezing between the gasholder and the tank.

Mr. D. M. Nelson (Glasgow) recommended crude oil as very much better than paraffin.

### Proposed Retirement of Mr. M'Gilchrist from the Convenership.

Mr. M'Gilchrist remarked that these "informal" meetings had now been continued for twelve years. He, with others, took part in the amalgamation of the North British Association and the West of Scotland Association of Gas Managers. It was thought to be too sudden a break to leave off the West of Scotland meetings, and the "informal" meetings were instituted. He thought the time had passed when there was a necessity for holding the meetings; and he begged to resign the Convenership of them. It had always been to him a great labour of love to arrange for the meetings; but he complained that very few managers gave him their assistance.

The Chairman said he was sure they all regretted the statement Mr. M'Gilchrist had made, because they always looked upon him as a sort of standing Convener; and everyone would admit that he did his duty well. He (the Chairman) would not like to see the gatherings stopped; but this was a question for the meeting to decide.

Mr. J. M'Crae moved that the meetings be continued; that they express their thanks to Mr. M'Gilchrist for the admirable manner in which he had carried them on hitherto; and that they request him to continue the Convener.

Mr. M'Gilchrist then consented to act for another year, on condition that he received more prompt responses to his circular convening the meeting.

This was put to the meeting, and agreed to; and, on Mr. M'Gilchrist's suggestion, Mr. A. Bell, of Dalkeith, was nominated Chairman of the next meeting.

### The Gas Institute Excursion.

Mr. M'Gilchrist asked leave, as that would be the only opportunity, to intimate that the Council of The Gas Institute had arranged that all the members of the North British Association of Gas Managers were to be invited to attend the meetings of the Institute, which were to be held in Edinburgh on the 11th, 12th, 13th, and 14th of June. There was, he added, to be an excursion on Friday, the 14th; and of this he gave full details.

### Votes of Thanks.

Mr. M'Gilchrist next proposed a vote of thanks to Mr. Yuill

for his conduct in the chair; and to Mr. Foulis for his kindness in showing them the Tradeston works.

These having been accorded,

Mr. J. WILSON, on behalf of Mr. Foulis, acknowledged the compliment which had been paid to him; and the proceedings then terminated.

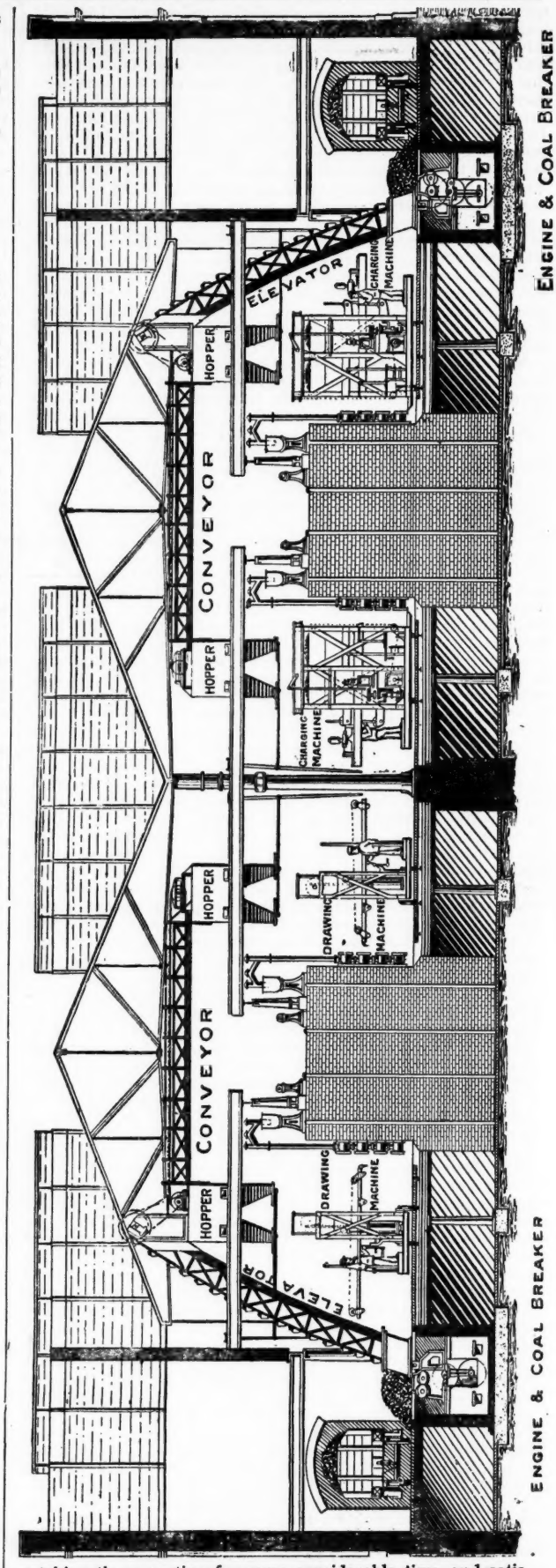
Those who had attended the meeting, and a number of friends, afterwards dined together in the hotel—Mr. Yuill in the chair.

## THE LABOUR-SAVING PLANT AT THE SALTLEY (BIRMINGHAM) GAS-WORKS.

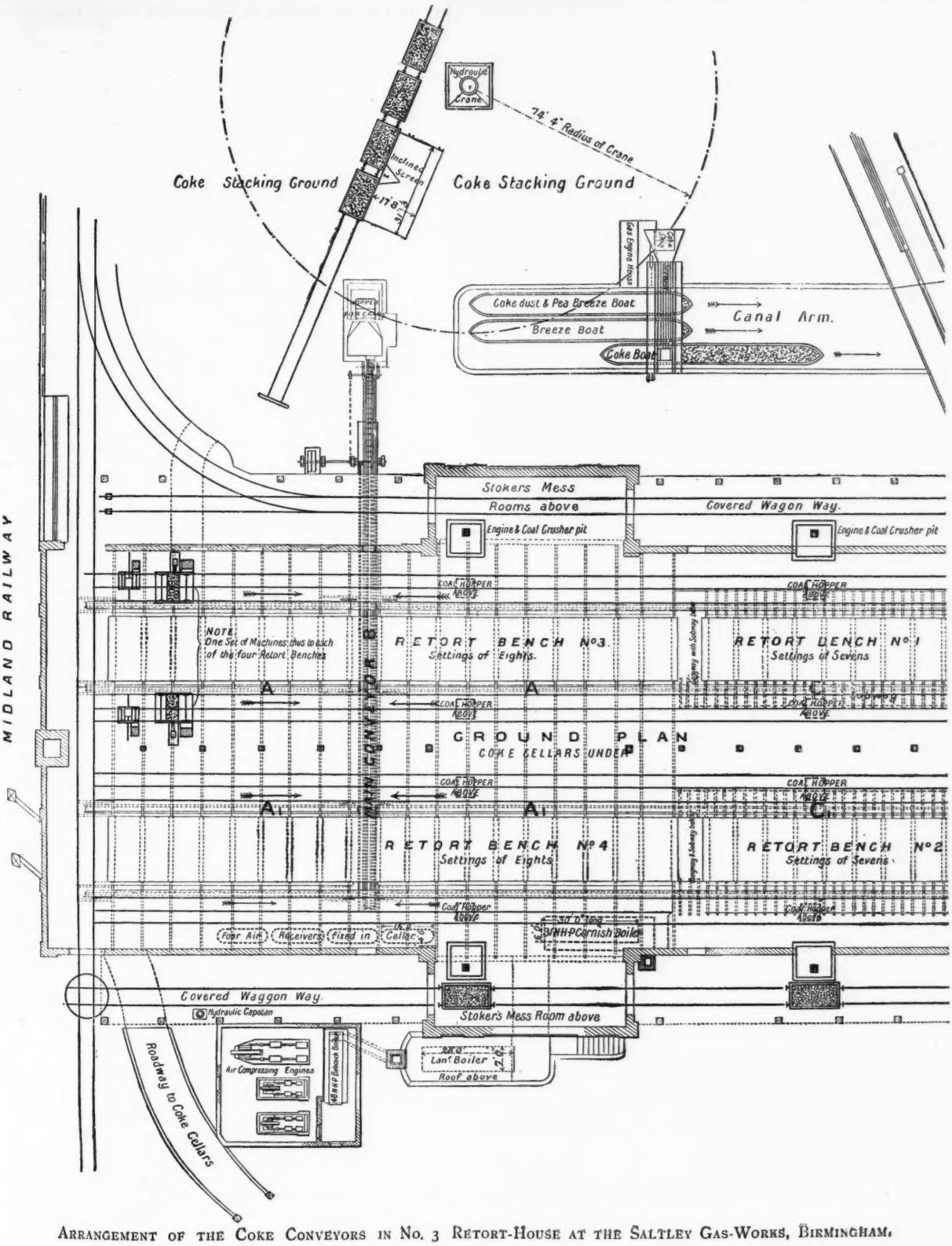
In the report which appeared in the JOURNAL for the 5th ult., of the proceedings at the meeting of the Midland Association of Gas Managers, a short notice was given of a visit which the members paid to the Saltley Gas-Works of the Birmingham Corporation for the purpose of inspecting the labour-saving plant in operation there. A fitting preliminary to the visit was supplied by the Engineer of the works (Mr. Henry Hack) in the shape of a specially-prepared statement, giving an account of the circumstances attending the introduction of the labour-saving plant and a general idea of its character; and from a number of drawings of individual parts of the machinery which he had also kindly provided, the members were able to gather further details. The following is the statement read to the members by Mr. Hack:—

The labour-saving appliances which you have been invited to inspect at the Saltley Gas-Works consist of (1) charging and drawing machinery, (2) hydraulic coke-stacking crane, (3) coke-screen for screening and loading coke into trucks direct, (4) coke-conveyors, (5) coke-screen for screening and loading coke into boats direct—all in connection with No. 3, the most modern of the retort-houses at Saltley. This retort-house is of the double type, without coal-stores; a portion of it measuring 108 ft. 6 in. in length, 124 feet in breadth, and 27 feet high to the wall plate. It was built in 1873 under the direction of my predecessor (the late Mr. Hugh Young), and was upon the old lines—a ground-floor house. It provides accommodation for two retort-benches, containing 147 retorts, in settings of "sevens," all 20 ft. long and 20 in. by 16 in. The old system of direct firing was adopted; at that time very little if anything having been done in England in the matter of gaseous firing for heating gas-retorts.

The extension (forming by far the principal portion of this retort-house) was designed and erected by myself in 1876 on the site of the old tar-works, immediately after the transfer of the Companies to the Corporation. It is upon the stage-floor principle, and is 198 ft. 9 in. in length by 124 ft. wide, of the same height as the older portion, and with it making a double house, a little over 307 ft. long by 124 ft. wide within the walls. The coke-cellars are of the same length and width as the new portion, and 9 ft. 6 in. deep from the stage-floor level; the stage-floor being formed by wrought-iron girders, and brick "jack" arches carried by five rows of cast-iron columns down the centre avenue, and two rows on the outer sides of the retort-benches. The extension provided for two retort-benches, each 180 ft. 5 in. long, containing nineteen beds of nine retorts, now altered to "eights," set in four tiers, which were originally heated by "direct" firing. Between 1882 and 1884, all the settings in this house were converted into "regenerators," by underpinning and excavating between the piers, without in any way interfering with the upper parts of the bench. The tops and second row of retorts were formerly charged from a travelling stage; but, shortly after the building of the extension, the introduction of power stoking machinery at large works was again being considered in various directions. Holding the views I do that men should be relieved, as far as possible, of the hot and laborious work of charging and drawing by hand—when at all events it can be done as efficiently and as economically, if not cheaper, by machinery—I began to watch carefully the progress made in that direction, visiting Beckton in 1877 to see the Foulis hydraulic machinery which had been installed there by Messrs. Tangyes Limited, but with such poor success that it was subsequently removed. [In this reference to the Foulis machinery, it should be understood that I am not alluding to the modern and improved Arrol-Foulis machines, which it is known are working successfully at several large works.] Upon hearing that a more successful installation of the same system had been introduced at the Manchester Gas-Works, I availed myself of an opportunity offered me in 1879 of inspecting the working of it there. But not being sufficiently impressed with the system as then carried on, which, with all things taken into account, did not appear to promise any material saving over the cost of our hand labour, I deemed it prudent to wait longer for the further development of this or other systems. I therefore let the subject rest until August, 1882, when, being in Manchester, I visited the Rochdale Road works, to learn what was then being done in the matter of machinery. I found that an installation of "West's" coal-breaking and stoking machinery had been made in one of the large retort-houses; the motive power being compressed air. After




watching the operation for some considerable time, and satisfying myself as to the cost of working compared with hand labour, I felt justified in recommending my Committee to authorize its adoption for the two long retort-benches above named, consisting of two coal-breakers and engines, two pairs of rakes, and two pairs of chargers, with a pair of air-compressors, &c., complete. The machines were supplied and first




ARRANGEMENT OF THE COKE CONVEYORS IN No. 3 RETORT-HOUSE AT THE SALTLEY GAS-WORKS, BIRMINGHAM.

started to work by October, 1883; but, owing to various alterations, strengthening, &c., which were found necessary for dealing with the four tiers in height, it was nearly twelve months after that date that we were able to get them into regular working. Unfortunately, when the retort-benches were built, ⌂ patent mouthpieces were not made; and the mouthpieces had to be shaped for the 20 in. by 16 in. ⌂ shape at the back, and 17 inches diameter round at the lid, which renders the operation of drawing the coke a little more difficult, and throws more strain upon the drawing-machines than if the mouthpieces were of the same section as the retorts throughout. From 1884 to 1891, the plant was continued to be worked as long as possible consistent with the necessary annual repairs. No further additions were made, although during that period it was found necessary to substitute the original Willan's engines by larger and stronger ones—notes being made from time to time of improvements which might be effected in any extension of the system at Saltley.

The eight-hour system being started at the end of 1889, requiring more men, I felt justified in 1891 in recommending an extension of the machinery to the extent of four additional drawing-machines and another air-compressor, and the duplicating of the coal-breaking apparatus, embodying all the improvements up to that date. In 1892, owing to a difficulty arising with the men in reference to charging the beds of "sevens" with the existing chargers, on the ground that "it was not in their schedule of work," I recommended the Committee to authorize the further addition to the plant of four new chargers, fitted with engines of West's own design and make, and strengthened in many directions, and embodying all the improvements which our past experience had suggested. These were supplied and put to work on the two long benches in

1893; the older machines being relegated to the settings of "sevens." In the first set of chargers, the scoop was made, at my suggestion, large enough to put the charge in at one stroke; but as in practice it was found that the retort was very seldom well filled up in the angles (the charge taking the form of a convex curve), I agreed to Mr. West's suggestion that, with the new machines, the charge should be given at twice—one charge being turned to the right, and the other to the left. While in this way the charge is *more* evenly laid, it is not at times by any means perfect; the thickness of the coal still being greater in the middle than at the sides. To overcome this in future, Mr. West has arranged to apply a slight sliding motion (to the right or to the left as may be required) just before the turning over of the scoop takes place. During the past winter, every retort in this house has been drawn, and all (with the exception of those in the two end beds of "sevens") charged by machinery. The number of hands employed (excluding coke men, but including coal unloaders, air compressor, boiler, and all attendants) is 148 per 24 hours, as against 220—the number that would have been required for hand labour under the eight-hour system. This reduction of 72 hands relates to the charging and drawing plant only.

*Statement of Coal Carbonized and Machinery for Working New Retort-House.*

The maximum quantity of coal carbonized by machinery in No. 3 House equals 609 tons per diem—all 5·20 work.

Four pairs of drawing-machines; two pairs fitted with Willan's engines for lifting the rake-bars.

Four pairs of charging-machines, with Willan's engines.

Four sets of coal breakers and elevators and conveyors, each set worked by vertical high-pressure steam-engines, 10-inch cylinder, 12-inch stroke.

Four air-receivers, 4 feet diameter, 16 feet long inside.

One Cornish boiler, 6 feet diameter by 30 feet long, 54 nom. h.p.

One Lancashire boiler, 7 feet diameter by 28 feet long, 31 nom. h.p.

One Babcock and Wilcox boiler, 48 nom. h. p.

Two air-compressors, having each—two steam-cylinders, 12 inches diameter by 1 ft. 6 in. stroke; two air-cylinders, 10¾ inches diameter by 1 ft. 6 in. stroke.

One air-compressor, with two steam-cylinders, 13 inches diameter by 2 feet stroke; two air-cylinders, 14 inches by 2 feet stroke.

Steam working pressure, 70 lbs. per square inch.

Air working pressure at machines, about 60 lbs. per square inch.

Originally the air supply from the receivers was given through hose piping wound round a central drum; but, owing to the loss of air through the pipes, frequent breakages of hose, and other expenses and inconveniences, we supplanted this method at an early date by wrought-iron horizontal pipes the full length of the house, with down branches at intervals, fitted with gun-metal swivels at top, and bayonet connections at the bottom for attachment to the short hose on the machines; and these have been found to answer much better in all respects than the drum and hose arrangement.

I now come to the coke-crane. This was so fully illustrated and described in detail in the *Engineer* of May 12, 1893, and in the JOURNAL OF GAS LIGHTING the following July, that I need not recapitulate all particulars, but would mention that it has proved a great success in all respects, fully realizing all the benefits that were expected to result from it. It will be remembered that it was originally intended simply to supplant the arduous manual labour of stacking to a great height, over the limited area between the viaduct and the retort-house, the surplus coke made in the winter. This work involved steep and circuitous barrow-roads, and to accomplish it two men to a barrow load were often required, while in wet and snowy weather, it was difficult to find men to do the work at all at night—the retort-house work being occasionally delayed, pending the replacing of men who had "given in." The coke wheelers' "stint" is limited to taking the coke to a maximum distance of 20 yards outside the retort-house; and the coke crane pit was therefore placed within that distance. From this point, the crane deals with it; and the maximum number of hands saved per day of 24 hours when the crane is used for stacking is 28.

Although it is usual for coke to be stacked to some extent in the winter months, in times of poor demand, the quantity which has to be stored is often considerable; and in such cases the provision of the crane has been found a great boon for the purpose. But when the coke trade is good, in the summer months more especially, very little stacking is wanted; and the saving is limited to the number of "runners away" dispensed with—about 16 per day of 24 hours. This led me to consider if the crane could not be fully employed at all times—good, bad, or indifferent—by using it in connection with the screening and loading of the coke brought out of the pit, which resulted in the provision of the stationary screen—item No. 3 on the list—upon which the contents of the crane-skip are tipped at the top; the coke being efficiently screened from breeze and dust in its passage downwards over the screen.

The area of the screen is 31 ft. 3 in. by 17 ft. 6 in. It is constructed of wrought-iron braced framework on firm foundations; the screen proper being formed of 260 bars, 1¼ in. by $\frac{7}{16}$ to $\frac{5}{16}$ in., 1$\frac{7}{16}$ in. centres, forming the mesh required to let nothing but the breeze and dust through. It is set at an angle of 40°, which was fixed upon after various experiments with a small screen. In practice, however, we find it would have been better if the angle had been slightly greater, as some of the coke at each tipping of the skip remains on the screen, although, by keeping the bottom row of bars free, which is done by the man and lad appointed to pick out bats and level the coke in the railway trucks, very little inconvenience is experienced even at the angle it is. Yet a *slightly* greater angle would certainly be preferable for the purpose. When unscreened coke is wanted, it is tipped from the crane-skip into the truck or boat direct. The screen is capable of dealing with the whole of the coke and breeze from No. 3 house when fully at work, amounting to 310 tons per 24 hours, after deducting the quantity used for fuel; the crane being also well able to lift and tip this quantity. The breeze and dust, for which there is not always such a regular demand as for the coke, falls to the space under the screen. Part is riddled by hand, and the breeze loaded into trucks; and the remainder is removed (at present by boat) in bulk, to be dealt with for the washed breeze trade at the other end of the works. The cost of screening only in this way ranges from 1d. to 1½d. per ton, against 4d. for hand labour; and the number of hands saved when the screen is fully employed averages 12 per day of 24 hours.

The next step taken to economize labour was the introduction of conveyors to catch and take away the coke as drawn from the retorts direct. Although the fourth on my list, it is a matter which had my attention so long ago as the year 1884, and resulted in a patent being taken out jointly with Mr. Ley, of Derby, which was described in the JOURNAL OF GAS LIGHTING in January, 1885. About that time, I recommended the adoption of the plan to my Committee; but the advantages over hand labour (twelve-hour system) being then not so apparent as they became when the eight-hour system was introduced, the matter was allowed to drop. In the meanwhile, conveyors for a like purpose became introduced at several other works; and early in 1893, I felt justified in again recommending a trial of them at Saltley, which met with approval. In March, 1893, as a first step, a contract was entered into with the Chain Belt Engineering Company, of Derby, for the plant required for dealing with the coke drawn from the insides of the retort-benches Nos. 3 and 4 of No. 3 retort-house, which was completed and set into regular work by Oct. 3, 1893. [The general arrangements of the plant were shown by drawings exhibited by Mr. Hack, two of which—a transverse section and a plan—we have reproduced.] The conveyors are driven by a 20-horse] power nominal "Otto" gas-engine by Crossley, which left a reserve for an extension of the system.

The conveyors are carried by a light (but sufficiently substantial) framework of wrought iron, principally composed of angle-iron 3 in. by 3 in. by ½ in.; the conveyor itself being constructed of mild steel pans $\frac{5}{16}$ inch thick, riveted to Ley's patent malleable cast-iron links, the pins of which are of wrought iron, case hardened. The upper and return rollers are cast iron, working on wrought-iron turned spindles. The sprocket wheels at the turnover ends are made of chilled cast iron.

This installation deals with 142 tons of coke and breeze per day of 24 hours, requiring 10 men, including engine and conveyor attendants and cleaners up, against 24 for the same work by hand per twenty-four hours. The plant worked successfully throughout the winter season of 1893-4. Upon careful examination at the end of the season, it was found that, by far the greatest amount of wear and tear arose on the main or "cross" conveyor pans and rollers; the longitudinal or side conveyors showing but little deterioration. One of the few difficulties to contend with consists in the comparatively large amount of fine coke dust, which, clinging to the pans on the outward journey, is jerked off on the return journey, on to the floor or pit, and requires cleaning up regularly to avoid obstruction. This was an unexpected nuisance, and adds slightly to the cost of working. It is taken into account in the saving of labour given. In deciding the details, I provided for mishaps by arranging for the deflecting-plates to be readily turned over, so as then to direct the coke to the cellar floor as formerly. As regards the quenching, at first it commenced as soon as the hot coke reached the pans by a series of "rose spreaders" from a continuous pipe parallel to the bench. This was subsequently found unnecessary—that the hot coke did no harm to the floor girders, shoot plates, or pans; that by the time it arrived at the main conveyor it had begun to cool; and that the quenching could be efficiently done by limiting it to the main conveyor—the amount of water used being thus reduced. The mess caused by the falling water and dust is now confined to the cross-conveyor pit; some of the water being used over and over again by the addition of a small bucket elevator. Notwithstanding the drawback of the accumulation of the coke dust, the large quantity of water required for quenching, and the considerable wear and tear, on the whole, I considered the result of the season's working warranted the system being extended; and a contract was entered into with Messrs. Piggott and Co. in August last for the work required to apply it, with slight variations in the details, up the newly constructed subways on the insides of the two short benches, which was completed in time for last season, and all has worked, and continues to work, very satisfactorily. The first and second installations together deal with 200 tons of coke and breeze per 24 hours, requiring a total of 11 hands against 35 required for hand work. I have carefully considered a further extension on the furnace sides of the benches, but find that, owing to 37 per cent. of the coke drawn on these sides being used in the furnaces,

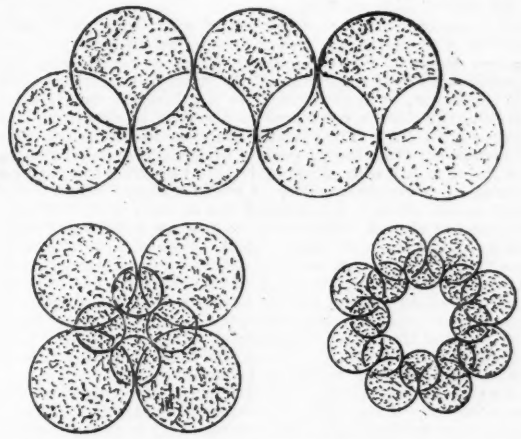
the advantages would scarcely warrant the outlay which, on account of the furnace and clinkering doors, would be somewhat greater than on the opposite sides. I have therefore practically decided to stop at the extent already gone to, except, perhaps, as regards the furnace side farthest from the canal arm, where it might be worth while to apply the system, principally on account of the distance the coke has now to be wheeled from that side. It will be noticed from what I have said that most of the coke produced in this house is now dealt with wholly by machinery from retort to consumers' trucks, and that the equipment of the house for carbonizing is almost as complete as could be arranged; also that, when the retorts are all in action, the various labour-saving appliances together effect an economy of 136 hands per day of 24 hours. I think it due to the Chain Belt Engineering Company to mention, at this point, that all the details of this coke-conveying plant were worked out by them, in conference with myself, to meet our special requirements; and with the exception of the deflecting plates and other minor matters, the same arrangements were adhered to in the extension of the system made last year.

As part of the coke sold goes away by canal, I decided to consider if a suitable arrangement could be devised in connection with the crane, for minimizing the labour and cost of loading and screening coke into boats; and having just at the time to visit the Fishley Colliery Company's pits near Bloxwich, my attention was drawn to Greenwell's patented system in use there for screening and loading coal, which work it was doing cheaply and efficiently. It at once struck me as likely to prove suitable for dealing with coke, but was a little dubious whether the operation would crush the coke too much. Learning that another of the screens was in operation at the Poynton and Worth Collieries near Stockport, I obtained permission to send some unscreened coke there for a trial. While the meshes were arranged for coal and not for coke, I was sufficiently satisfied with the experiment to be induced to recommend my Committee to authorize the expenditure for a trial of the system at Saltley; and the contract was given to Messrs. Stanley and Davies, the sole makers—the arrangement being to tip the coke from the crane-skip direct into a hopper, from which it is to be gradually released on to the screen. The motion to the screen is given by gearing to a 4-horse power nominal Tangye gas-engine. A trial of its working was made a few weeks ago with, I am sorry to say, unsatisfactory results in so far as the chains were found to "ride" up over the pulleys, resulting in a gradual accumulation of material under the chains, which eventually caused a block through larger pieces getting under than could pass the meshes arranged for by the bars. The meshes arranged for were $\frac{7}{16}$ inch for pea breeze and dust, and $\frac{7}{8}$ inch for breeze; each size being led by a shoot to a different boat, the coke falling over the end shoot. One of the causes of the difficulty experienced is the making of the meshes by the space between the bars instead of between the links of the chain and the bars, leaving the space below the chain wide and free, as in the case of the coal-screen at Poynton. Although these are points which prevent us so far pronouncing the plant a success for coke, they are not, I think, unsurmountable difficulties; and by a rearrangement of chain and bar, I see no reason why it should not be made to answer equally as well for coke as it undoubtedly does for the screening of coal into the various sizes—"large," "cobbles," "slack," and "dust."

## SOME NOVELTIES OF THE BUILDING TRADES' EXHIBITION.

The Building Trades' Exhibition, which has been open during the past fortnight at the Agricultural Hall, Islington, is an annual "fixture" which rarely contains anything calling for special notice in these columns. This year's exhibition, however, seems to be somewhat above the average in quality. The Hall is fairly well filled with a variety of necessary articles and appliances for builders' and decorators' use, with which a few exhibits of interest for engineers are included; and there are indications that the authorities have tried to discourage the "bazaar" element in connection with the show.

So far as the utilization of gas is concerned, there is not much to be learnt. Gas-engines performing work of different kinds are shown by Messrs. Crossley, Tangyes, and the Stockport firm. A few gas cooking-stoves of the ordinary patterns are on view; while the Incandescent Gas-Light Company are well represented. Messrs. Best and Lloyd's useful form of pendant is exhibited as applied to incandescent gas lighting. The engineering interest of the exhibition is centred in the various systems of fireproof construction shown; each, of course, claiming to be the best. The greatest novelty of this order in the Hall is the highly ingenious interlocking tubular construction invented by Mr. E. Lloyd Pease, and manufactured in a variety of patterns of pillars, beams, partitions, and ceilings by Messrs. Ashmore, Benson, Pease, and Co., of Stockton-on-Tees. The principle of this system will be understood from the accompanying illustrations, which represent the split tubes locked together to form walling and columns, and filled with concrete—air space being left in the former case. The tubes are machine-made, and can be turned out of any desired sizes and strengths. Description is really unnecessary; but the enormous stiffness and adaptability of this method of combining iron and cement concrete in construction can hardly be realized without inspection. More may be expected to be heard of Mr. Pease's invention in the future.



A good show of iron and steel articles, including gas and water pipes, rendered rustless by the Bower-Barff process, is made by the London Rustless Iron Company, of West End Lane, West Hampstead. It used to be said that the object of this process was to cover the treated surfaces with a skin of the black magnetic oxide of iron; but the colour now produced is a French grey. From water piping to water softening and filtration is an easy step, and can be made at Islington with advantage; for Messrs. Thwaites Bros., Limited, of Bradford, have here an important display of their well-known embodiments of Andrew Howatson's patents for attaining these objects.

Neither the ventilation nor the lighting of dwelling-houses is sufficiently exemplified at exhibitions of this kind; but notice is to be taken of a striking application to the former purpose, by Messrs. Baird, Thompson, and Co., Limited, of their air-propelling fan, driven as it is by a diminutive Robinson hot-air engine, kept in motion by an atmospheric gas-burner. There can be no doubt that the positive mechanical ventilation of public halls, churches, and places of assembly in general is growing in favour, and that there is an enormous field for appliances suitable to effect this purpose. It is obvious that, if electric motors are good for anything, this is exactly the kind of work in which such motors are likely to be found most useful, because the cost of the current would be a small consideration to set against the convenience of this method of driving ventilating-fans. A supply of electricity is not, however, always to be had. There does not appear to be any at Islington; and here the Robinson hot-air engine with gas fuel comes in handily to stop the gap. Gas engineers should note the circumstance. In connection with the subject of house ventilation, mention should be made of Simmance's patent exit-valve system of so-called "natural" air exhaustion. This is a new pattern of cowl, fitted with valves opening upward, and designed to come into action automatically immediately the wind pressure exceeds one grain per square inch. These cowls are declared to be always in order, and of great durability. The flue, or upcast pipe, is always full of the air from the interior to be ventilated, and cannot have a down-draught in it. This is certainly an advantage. Some form of imperceptible air-inlet ought to be combined with this exhaust arrangement.

**Society of Engineers.**—At the meeting of this Society on Monday last week, a paper was read by Mr. D. B. Butler, Assoc.M. Inst.C.E., on "Portland Cement; Some Points in its Testing, Uses, and Abuses." After stating the usual chemical composition of cement, and giving an account of the raw materials from which it is produced, the author proceeded to describe the chief methods of ascertaining its constructive value; special stress being laid upon the soundness of the material—viz., freedom from destructive agencies within itself. Some means of ascertaining this property were described; the author particularly advocating the moist heat and warm water apparatus devised by his late principal, Mr. Henry Faija, as giving the most reliable results of any test at present in vogue. In forming an opinion as to the strength of a sample, steady and progressive increase between the dates of testing were insisted upon as of primary importance. The influence of temperature upon the setting properties of cement was dealt with, and a few experiments were recorded showing the effect of such influence. Some of the uses of cement were briefly touched upon; and the effect which sea water has on unset Portland cement, as proved by experiment, was also described—the author's opinion being that salt water more readily attacks slow-setting than quick-setting cement. The chief points in the abuses of cement to which the author drew particular attention, as frequently causing failure, were: Inattention to the setting properties; use of dirty and unsuitable aggregate; insufficient maturing of the cement before use; and exposure to extremes of temperature.

## REGISTER OF PATENTS.

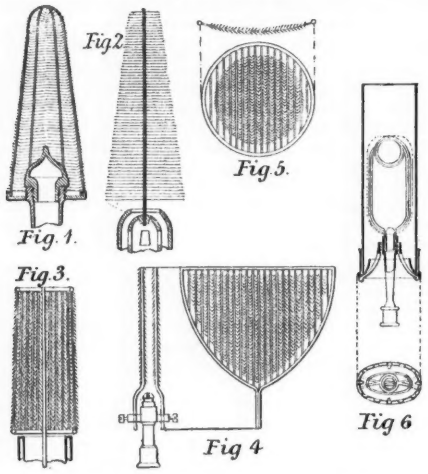
**Radiant Tissue for Incandescent Gas-Lamps.**—De Mare, F., of Paris. No. 10,606; May 31, 1894.

This invention relates to a process of manufacturing "a radiant tissue" in different shapes (sleeves, cones, sheets, yew leaf, &c.) of refractory material, "in the greatest degree of tenuity and solidity compatible with their employment." In principle it consists in "holding in suspension, or in dissolution, in a collodoide, the oxides which are difficult to reduce or volatilize—such as those of zirconium, erbium, yttrium, silicon, &c." The patentee proposes to utilize the property which certain of these metals possess of forming an ethyl compound, which, being mixed with alcohols, is able to form a collodion by the dissolving of a certain quantity of azotic cellulose. This collodion (the solvent of which is a mixture of one or more of these ether compounds and of alcohol, which may or may not hold in suspension or solution oxides or salts of these oxides), is drawn into a thread more or less fine, by its passage through a draw-plate, either in free air or in a liquid suitable for hastening its solidification. It is with the thread thus obtained that, by the ordinary methods, sleeves, cones, sheets, &c., are woven, which subsequent heating deprives of organic matter, leaving the oxides in a state of molecular subdivision which facilitates their irradiation, while at the same time the continuity of the texture insures great solidity and durability.

With very fine metallic wire (of platinum, for example), which constitutes the warp of the work, and threads of the radiant tissue, what is called in embroidery a chenille is made—that is to say, a collection of threads more or less fine radiating from the warp. This chenille, which is made in long lengths, is trimmed into the shape of lengthened spindles; and the warp may be even-bared between each spindle. The length of the spindle is equal to the length of the radiant surfaces; and the slope of the spindle is calculated so that, according to the dimensions of the surfaces required (cones or discs), the radiating threads of two neighbouring spindles may touch.

For example, the formation of a cone would proceed as follows: On a light ring of thin metal, and having a diameter slightly larger than the burner on which it is to be made radiant, a series of spindles is fixed, using the bare part of the warp—that at the lower part for fixing it to the ring, that at the top of the spindle to form at the top of the cone the supporting ring. This arrangement ensures great solidity on account of the presence of the metallic warp; while at the same time it permits the use of very fine threads for increasing the surface of the radiant material. Expansions are free; and the surfaces can be either suspended or rest on their base, without fear of collapsing.

As regards the shape to be given to the radiant surface, it must be the same as the flame, and of slightly larger dimensions—flat for wing burners; cylindrical or conical, for burners of the Argand type; semi-circular, for recuperative burners. The conical yew-leaf form is equally suitable for lighting, provided that the burner is suitable—such as in the present inventor's "ejector burner." *




In the accompanying illustration, fig. 1 is a cylindro-conical sleeve applied to this last-named system of burner. Fig. 2 shows the tissue in leaf-shape, set in the centre of such a burner. Fig. 3 is a slightly conical sleeve, applied to a Bengal or Argand burner. Fig. 4 is a front and side view of two parallel frames, applied to a wing burner. Fig. 5 is a plan and section of a frame intended for a recuperative burner. Fig. 6 shows a burner provided with a gauze of radiant thread arranged in the flame, shown in elevation.

Referring to these several forms, the patentee remarks: "In pursuing my tests on the manufacture, and on the most suitable shape for my radiant tissue, I have been led to study that of the flame, and to conduct the gaseous jet through orifices suitably combined. . . I have especially endeavoured, in combining these burners, to approach the form of the filament in incandescent electric lamps—that is to say, to obtain flat flames whose lengths are greater than their widths—in which I insert a filament of my tissue either in chenille with platinum core, or a series of wisps tied on this core by a simple knot, or, finally, by lace chain also on a platinum core."

### APPLICATIONS FOR LETTERS PATENT.

6066.—Scott, A., "Gas and oil engines." March 23.

6101.—Bullier, L. M., "Rendering acetylene and other gases rich in carbon suitable for lighting and heating purposes." March 23.

6119.—Given, W. J., "Joint for pipes." March 25.

* See Journal, Vol. LXIV., p. 476.

## CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

### The South Metropolitan Workman-Director Proposal.

Sir,—I only received here last night the Journal for the 19th of March. I gather from the leading article on my letter that the main point of my argument against the workman-director scheme is not thought worthy of notice; as no attempt has been made to controvert it. I allude to the logical difficulty—I may say impossibility—of the same person discharging the double and conflicting functions of master and servant, employer and employed, director and directed. No instance has been adduced of the existence of such a composite individual; and I take it that this is the initial difficulty which the opponents of the scheme cannot see their way to escape. Neither in theory can the proposal be logically formulated, nor in practice could the idea be carried out.

I learn that I am mistaken in supposing that you agree with Mr. Livesey that it is the natural outcome of the establishment of profit-sharing. But if it does not flow out of profit-sharing, it has no possible *raison d'être*. You say that my contention that the idea is an uncalled-for innovation which could not be carried out, is only an *a priori* assumption. Is it only an *a priori* assumption to declare that water cannot flow uphill, or that the whole is greater than a part? You can, of course, pump water through pipes uphill, and you can invert the position of director and directed. But I must still contend that one and the same person cannot, without a *reductio ad absurdum*, be made to exercise the two functions. I stated and restated this inherent difficulty; and up to this time I have seen no attempt to meet the point and refute it. If that difficulty can be removed out of my way, I shall be able to discuss the plan as, at any rate, a feasible proposal.

You comment on my "admission" that the employees of our Company could probably obtain profit-sharing if they wished for it; and you assume that, because the Court do not force upon their employees a scheme which is desired by neither party, they are adopting an unworthy attitude, as it is their function to decide what is the best principle of rewarding the labour performed in their service. I entirely demur to such an assumption. If the workmen desire to take some of the risk of profit and loss by investing a portion of their earnings in the Company's business, why should the Court refuse them the necessary facilities? It would make no difference to the shareholders in general, and would be financially neither for the good nor to the detriment of the Company, provided always that a rate of wages, in excess of the current rate, were not paid under the system of profit-sharing. To my mind, to force such a system upon unwilling employees would be an infringement of the spirit, if not of the letter, of the Truck Acts. I am quite ready to admit, and even to affirm, that the methods by which wages are paid, but not the rates, are questions more for the men who receive the wages than for the Court which pays them; but that is no reason for importing workmen on to the governing body.

The Wharncliffe meeting of the South Metropolitan Gas Company was called by advertisement to approve or reject a draft Bill which was placed before it by the Board. The shareholders were not summoned to frame a Bill, nor to discuss any matter or question not given notice of in the advertisement. The division of opinion at the Board was not referred to in the notice; and it was therefore entirely out of order, as well as without precedent, for the Chairman to ask for a resolution or "expression of opinion" directed against the majority of his colleagues, to be passed by a meeting called for a specified and limited purpose. But I do not desire to any further discuss that unpleasant incident.

Wm. Thomas Makins.

*Hotel Santa Clara, Funchal, Madeira,*
*March 29, 1895.*

### Alleged Infringement of Enrichment Patents.

Sir,—We trust you will give us the opportunity, through the Journal, of correcting the report that has been circulated, that certain patents which we hold and control infringe upon certain claims of the patents now held and controlled by the Oil-Gas Enrichment Company (the Peebles process). We desire to say that our patents do not in any way infringe upon the rights of those granted to Mr. Young or any other patentee; and that we prefer our own system of manufacturing carburetted water gas, which is based upon actual experience covering a number of years.

J. T. Westcott, Manager and Treasurer,
The Economical Gas Apparatus Construction Company, Limited.

*April 8, 1895.*

### Removing Carbon from Gas-Retorts.

Sir,—I regret that I did not see Mr. Gibb's letter on the above subject (*ante*, p. 646) in time to reply to it in your last issue; and I now beg to offer a few remarks, both in answer to it and to the subsequent letters from Mr. Shadbolt and Mr. Roper.

Mr. Shadbolt admits removing the scurfing in 40 minutes. This I take to be a double or through retort; or if one of an old bench, and full of cracks, it would then probably take the time mentioned. The retort referred to by Mr. Roper was probably one that had not been cleaned many times. Hence, as compared with the one referred to by Mr. Shadbolt, and presuming, as before mentioned, that it was an old bed, and the retort very full of patches and cracks, this would account for the great difference in the time taken between the two—*i.e.*, 10 minutes in one case, and 40 minutes in the other. The average time is about 20 minutes; and, with ordinary care, it is impossible for the water to do any damage to the retorts.

The way in which the work is done means the loss of one charge (six hours); but if the retort is slacked back, and the scurfing done at once, *before* the other retorts are drawn, there is no loss of time or gas, as the carbon has not time to get loose in the cracks of the retorts. As to the thickness of the carbon deposit, it is found that from 2 to 3 inches remove more easily than a thin substance; and being then so easily removed by the new method, it should not be allowed to get more

than from 1 inch to 2 inches thick. The water required to remove the carbon from a single retort is about 3 gallons; and the operator should have a tap at the end of the tube, to check the force of the water, or to turn it off when required.

In conclusion, I consider a failure next to impossible in using this method; and the saving to gas companies in coal, materials, tools, labour, and trouble is enormous.

S. SPENCER (Good and Spencer).

14, *Great St. Thomas Apostle, E.C., April* 8, 1895.

### The Density Value of Hydrocarbons.

SIR,—Not one of the authorities referred to by Mr. Lewis T. Wright states, in my opinion, in explicit terms, that the luminous efficiency of hydrocarbons increases with its density. Will Mr. Wright repeat, in the original, a paragraph of any of his authorities, showing that it was clearly realized that the higher densities gave higher luminous efficiencies? If this important fact of high efficiency due to density is so very obvious, it is strange that Mr. Wright has so few authorities, especially English ones, who have thought it their duty to teach the lesson. Dr. Siemens simply suggested division of the gases evolved from coal in heated retorts, because he recognized that the more luminous volatile hydrocarbons come off in the first period, whereas the gases in the last period have a higher proportion of heating value compared with lighting value. But the all-important fact that the density of the hydrocarbons is an index of their lighting values is not, as far as I know, stated. If so, Mr. Wright can prove me wrong.

*April* 3, 1895. J. W. VICKERS.

### The Oil-Gas Works at Tientsin.

SIR,—It may interest some of your readers to see an account of an oil-gas works constructed at Tientsin, in North China, of which the undersigned was the constructing engineer. They were carried out in 1889-90; and they light the whole British and French settlements, as well as some Chinese streets. Oil gas was adopted in preference to coal gas on account of the first cost; the former being only about half that of the latter. The plant was purchased from Dr. Hirzel, in Saxony, whose guarantees were as follows: (1) The average life of a retort to be not less than 120 days (continuous working), with an hourly production of 300 to 400 cubic feet of gas. (2) 100 lbs. of kerosene oil to yield about 950 cubic feet of gas. (3) That a burner consuming 1½ cubic feet per hour should have a lighting power of not less than 12 normal candles. (4) It was estimated that, for the evaporation of 100 lbs. of oil, 380 lbs. of coal would be required.

The plant has now been working for more than five years; and the actual results have been as follows: (1) The retorts had an average life of somewhat more than 120 days; and the hourly production was about 320 cubic feet. (2) The average yield of 100 lbs. of oil was rather more than 1100 cubic feet and 30 lbs. of tar. (3) A burner consuming 1½ cubic feet per hour gave a light of about 15 candles. (4) Only 165 lbs. of No. 5 seam lump Kaiping coal were used for the evaporation of 100 lbs. of oil.

The undertaking has proved a financial success, notwithstanding that the street lighting is done at such a low price that the Company make nothing on this account; but the fact that the gas is free from impurities, and does not pollute the air in rooms, has made it such a favourite for indoor lighting that it has been adopted in almost every household.

A. DE LINDE, Assoc.M.Inst.C.E.

*April* 3, 1895.

**Kimberley Water-Works Company, Limited.**—The report of the Directors of this Company for the year ending Dec. 31 last, shows a balance of £12,753. After providing for interest on debentures and debenture stock, and sundry items of depreciation at Kimberley, the net profit for the year is £5965. The Directors now propose to take £335 from the contingency fund, to increase this amount to £6300, and to pay a dividend of 2 per cent. From the same fund they have written off £1500 from construction account as depreciation.

**Sale of Stock in the Newcastle and Gateshead Gas Company.**—At the offices of the Newcastle and Gateshead Gas Company last Wednesday, Mr. R. Mack offered for sale by auction so much new consolidated stock, of the estimated amount of £3000 (nominal) or thereabouts, of the Company as was necessary to produce, including premiums, a total sum not exceeding £6223 6s., being the balance of the moneys authorized by the Newcastle-upon-Tyne and Gateshead Gas Act, 1879, to be raised by means of new consolidated stock. No further stock can be issued without parliamentary sanction; and for this, the last instalment of the stock authorized by the Company's Act of 1879, there was a very spirited competition. In the result, the stock sold to realize the necessary £6223 6s. was only of £2944 12s. nominal value; so that the Company obtained a premium of £3278 14s. The prices paid ranged from £210 10s. to £212 per cent.

**The Dublin Corporation Surcharged.**—At their meeting on Monday last week, the Dublin Corporation had under consideration a letter received from the Local Government Board, enclosing the surcharges made by Mr. Drury, the Auditor of the Corporation accounts, in reference to various matters since 1892. These surcharges referred, among other things, to the cost of the visit of the Water Committee to the Roundwood reservoir, and of ex-Lord Mayor Shanks to the Chicago Exhibition, amounting to upwards of £300. Since the surcharges took place, there were also to be considered the heavy costs incurred in resisting the application for an injunction which Mr. A. Findlater obtained against further proceeding this year, under the Borough Funds Act, with the Corporation Bill, as reported in the JOURNAL last week. In reply to questions, it was stated that the total amount surcharged or payable in reference to costs by the members was considerably over £1000. A discussion took place as to the manner in which the demand should be met. The Lord Mayor undertook to subscribe £100, ex-Lord Mayor Shanks said he would contribute £100, and it was mentioned that ex-Lord Mayor Meade would add £100. Several members said they would contribute considerable sums; while others expressed disapproval of the expenditure.

## LEGAL INTELLIGENCE.

### HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

**Thursday, April 4.**

(*Before Justices* CAVE *and* LAWRANCE.)

**The Queen v. The London County Council (ex parte the Commercial Gas Company).**

Our readers may remember that, in December last, an application was made to the Divisional Court, on behalf of the Commercial Gas Company, for a *certiorari* calling upon the London County Council and Dr. A. W. Williamson, the Chief Gas Examiner for the Metropolis, to show cause why a determination and report made by him should not be brought up and quashed.* The allegation of the applicants was to the effect that the report had been made without jurisdiction, inasmuch as evidence was taken by the Chief Gas Examiner without notice to them. The Company also sought to raise two points—(1) that, in the Wellclose Square case, the candles, not being in accordance with the specification then in force, were not "candles" within the meaning of the Act; and (2) that, in the Parnell Road case, the candles were not supplied by the Company, as the Act required, having been provided by the London County Council. Their Lordships (Justices Grantham and Lawrance) granted a rule *nisi*.

Mr. MACMORRAN appeared for the County Council; Mr. BOSANQUET, Q.C., and Mr. A. T. LAWRENCE, for the Commercial Gas Company; and Mr. SUTTON and Mr. NEISH represented Dr. Williamson.

Mr. MACMORRAN said he appeared, on behalf of the London County Council, to show cause against the rule for a *certiorari* which had been obtained for the removal into this Court of two records of the Chief Gas Examiner for the Metropolis, in which he affirmed the decisions of certain gas examiners who on two occasions, having tested the quality of the gas supplied by the Commercial Gas Company, had found it deficient. The Company appealed to the Chief Gas Examiner, who decided against the Company; and it was now sought to be suggested that his determination was come to without jurisdiction.

Mr. BOSANQUET remarked that the Company had appealed against the reports of the gas examiners; and that the Chief Gas Examiner had, in the appellants' view, improperly confirmed those reports.

Mr. MACMORRAN said the question before the Court had arisen on the construction of two Acts of Parliament—one being the Commercial Gas Act, 1875, and the other the Gas Companies' Acts Amendment Act of 1880. In section 22 of the Act of 1875, provision was made for the appointment by the Board of Trade of Gas Referees; and by section 26 it was provided that the Referees should, subject to the provisions of the Act, from time to time prescribe and certify the mode to be adopted for testing and recording the illuminating power of the gas supplied by the Company, and the number and times of the tests made. By section 32, it was provided that the Referees should from time to time prescribe and certify the situation and number of the testing-stations, and the apparatus and material to be used therein, for testing the illuminating power, purity, and pressure of the Company's gas; and the Company were to provide and maintain such testing-places, apparatus, and materials accordingly. By section 35, it was enacted that the Metropolitan Board of Works (since superseded by the London County Council) should appoint competent and impartial persons to be gas examiners; and that there should be a Chief Gas Examiner (the office at present filled by Dr. Williamson), who should be a competent and impartial person from time to time appointed by the Board of Trade. In the Act of 1880, there was a series of sections, commencing with section 6, enabling the Gas Referees to certify the mode to be adopted in testing the Company's gas. Then section 12 provided that, if the Company should think themselves aggrieved by the report of any gas examiner, they might, within seven days after the date on which such report was delivered to them, appeal to the Chief Gas Examiner, whose decision, after hearing the parties, was to be final and conclusive; and this official was forthwith to report his decision to the controlling authority (in this case, the London County Council) and to the Company. If the Company did not appeal, his report was to be final and conclusive. On April 2, 1894, the gas examiner at the Wellclose Square (St. George's-in-the-East) testing-place tested the Company's gas, and found that it was deficient in illuminating power; and on the 3rd of May, the gas examiner at the Parnell Road (Old Ford) testing-place made a similar report. Appeals against these reports were brought before the Chief Gas Examiner; and he affirmed the decision of the local examiners.

Justice CAVE: The Company say that he heard evidence behind their backs.

Mr. BOSANQUET said this was one point.

Mr. MACMORRAN said the question would arise whether the *certiorari* would lie at all in this case.

Justice CAVE: What is the other point?

Mr. BOSANQUET said it would appear that the reports of the gas examiners were made contrary to the statute.

Justice CAVE asked in what way.

Mr. BOSANQUET replied that the tests had been made with uncertified candles. The candles must be certified, having been treated in a particular way, in order to set the forfeiture clauses in motion.

Mr. MACMORRAN then proceeded to read the affidavit of Mr. H. E. Jones, M.Inst.C.E., the General Manager of the Company. It set out that the provisions for testing the illuminating power of the Company's gas were contained in the Commercial Gas Act of 1875 and The Gas-light and Coke and other Gas Companies' Acts Amendment Act of 1880. By section 6 of the Act of 1875, the candles to be used in testing the illuminating power of the gas were defined as sperm candles of six to the pound, burning 120 grains an hour; and by section 32 of the Act, it was provided that the materials to be used for testing should be furnished by the Company. The candles used for the purpose of conducting the tests had always been made in accordance with the definition contained in the Act of 1875. In the month of

* See JOURNAL, Vol. LXIV., p. 1123.

December, 1893, the Metropolitan Gas Referees issued a "Notification" prescribing a new candle to be used in place of the candle defined in the Act of 1875, and used without question since the passing of the Act. The Company had never been able to obtain candles in accordance with this "Notification," which had since been abandoned. On April 2, 1894, the Company received an intimation from a gas examiner that the gas supplied by the Company, as tested at the Wellclose Square testing-place, had been found to be deficient in illuminating power. On April 6, 1894, they gave notice of appeal from this report to the Chief Gas Examiner. On May 3, 1894, the Company received a report from a gas examiner to the effect that the gas tested at the Company's Parnell Road testing-place had also been found deficient in illuminating power. On May 7, 1894, the Company gave notice of appeal from this report. With regard to the testing on the 2nd of April at the Wellclose Square testing-place, the candles used in the test were those which had been supplied by the Company to the London County Council on July 15, 1893, before the Referees had issued their "Notification" of December, 1893, and were not made in accordance with its requirements. An intimation had been received from the gas examiner, in or about August, 1893, to the effect that he was instructed not to use these candles for the purposes of testing. No certificate approving of the candles had ever been forwarded to the Company, as provided by section 25 of the Act of 1875. With regard to the candles prescribed by the "Notification," the Company, though taking exception to the Referees' right to make any alteration in the candles prescribed by the Act of 1875, endeavoured to procure from Messrs. T. Miller and Son, of Westminster, candles in accordance therewith. Messrs. Miller were well-known candle manufacturers; and for many years they had supplied candles for testing purposes to the Commercial and other gas companies. The Referees had also from time to time consulted Messrs. Miller upon various technical questions before the issue of the "Notification;" and the firm were generally recognized as the leading manufacturers of candles for testing purposes, and were so employed by the London County Council. From inquiries made in March, 1894, he learned that Messrs. Miller had been unable to supply candles in accordance with the Referees' "Notification." In consequence of that "Notification," however, the Company applied by letter on April 19, 1894, to Messrs. Miller for six packets of the candles prescribed in the "Notification," and, in reply, received a letter stating that the candles were not then ready. On April 28, 1894, Mr. Jones received from the County Council a letter intimating that, pending the receipt of the candles from the Company, the Council proposed to carry on the testing with certain candles they had themselves obtained from the Messrs. Miller. The Company replied by letter on May 3, 1894, declining to be bound by the tests with candles not supplied by them in accordance with section 32 of the Act of 1875. To the best of Mr. Jones's belief, the candles supplied by Messrs. Miller to the County Council were not candles conforming to the "Notification," but were an experimental approximation to that specification; it being found impossible to manufacture the candles prescribed thereby. The test at the Parnell Road station on May 3, 1894, was made by means of the candles so obtained by the County Council; and up to that date the Company had been quite unable to procure a supply in accordance with the "Notification." Since that date, the "Notification" had been abandoned as impracticable; and the County Council had reverted to the candles in use since 1875. On the 28th of August, Mr. Jones attended before the Chief Gas Examiner with Mr. T. B. Kent, one of the Company's Managers. Mr. Greenwood appeared in support of the reports of the gas examiners on behalf of the County Council. The Company's objections to the two reports were then explained to Dr. Williamson; and on Sept. 4, 1894, Mr. Jones recapitulated his objections in writing. The Chief Gas Examiner made his report on Oct. 6, 1894. On Oct. 11, 1894, Mr. Jones addressed to Dr. Williamson a letter calling attention to various points arising upon his award, and particularly to the fact that he had, apparently after hearing the representatives of the County Council and of the Company, obtained evidence and information bearing upon the question at issue, of which evidence he had not advised the Company, nor given them the opportunity of rebutting it. Mr. Jones also said he had been informed by the Referees that the candles provided by the County Council were not certified by them with the intention that their certificate should have the effect of making such candles the subject of a legal test for the purpose of enforcing penalties.

Justice CAVE asked if both the reports were dealt with by the report now sought to be brought up.

Mr. MACMORRAN said they were.

Justice CAVE: If the report of the Chief Gas Examiner is bad in part, is it bad altogether, or can it be separated?

Mr. MACMORRAN: I think it would be capable of being separated, because it deals with two separate and distinct findings of different gas examiners.

Mr. MACMORRAN then read Dr. Williamson's report as follows:—

*In the matter of the appeals of the* COMMERCIAL GAS COMPANY *against the report from the Wellclose Square testing-place, showing deficient illuminating power in the gas delivered by the Company on April 2, 1894, and against the report from the Parnell Road testing-place showing deficient illuminating power in the gas delivered by the Company on May 3, 1894.*

Each of these appeals was lodged within seven days after the day on which the respective reports were delivered.

At the hearing which I gave to the parties in these appeals, Mr. Grimwood appeared for the County Council; Mr. Henry Jones appeared for the Company.

It was contended on behalf of the Company that the tests were not valid, inasmuch as they were performed with candles which had not been certified by the Referees and provided by the Company.

It was stated on behalf of the Council that the tests were performed correctly, and in accordance with the "Instructions" of the Gas Referees. This statement was not impugned by the Company.

It appeared, from the evidence of the gas examiner at the Wellclose Square testing-place, that the candles employed on the 2nd of April were taken from three packets stamped and supplied by the Company, and that there were at that time no candles obtainable in accordance to the prescription issued by the Gas Referees. The Company stated that these candles had been obtained from Messrs. Miller, and were similar to those which had been for many years in use before the Gas Referees had been requested to prescribe and certify the candles to be used.

The gas examiner at the Parnell Road testing-place gave evidence to the effect that the candles used on 3rd May were taken from sealed packets certified by the Referees, and supplied by the Council. It appears, from letters which they put in, that the Company were informed by the Council on the 28th of April that candles as prescribed by the Referees were obtainable for certification by the Referees, and for supply by the Company to the testing-places. The Company did not, however, think proper to provide such candles.

They had previously objected to the use of candles thus prescribed by the Referees. It must not be forgotten that the Referees were appointed under the Special Act as competent and impartial persons to prescribe and certify (*inter alia*) the materials to be used in the testing-places, and also that the Company are ordered to provide such materials accordingly.

There is, moreover, in the Act a very distinct order that daily tests be made of the illuminating power of the gas at each testing-place (see clause 7 of The Gaslight and Coke and other Gas Companies' Acts Amendment Act, 1880); but there is no provision in the Act for the failure of the Company to provide materials as prescribed by the Referees.

Under these circumstances, the controlling authority directed their Chemist to send to the gas examiners a supply of candles as prescribed and certified by the Referees, to be used until the Company supplied similarly certified candles. Such candles so supplied by the Council were employed in the tests at the Parnell Road testing-place on the 3rd of May.

I am distinctly of opinion that the report of the gas examiner showing deficient illuminating power in the gas supplied by the Company at the Wellclose Square testing-place on the 2nd of April must be accepted; also that the report of the gas examiner showing deficient illuminating power in the gas delivered at the Parnell Road testing-place on the 3rd of May must be accepted. (Signed) ALEX. W. WILLIAMSON, Chief Gas Examiner.

*High Pitfold, Haslemere, Oct. 6, 1894.*

*Note.*—The Company contended that all tests, whether of the purity of the gas or of its illuminating power, which had up to a recent period been performed, were invalid, inasmuch as they were performed with materials which had not been certified by the Referees and provided by the Company. They did not include in their contention the first and foremost injunction laid on the Referees in the clause relating to these matters—namely, that they shall prescribe the materials, &c., to be used in the testing-places. In hearing the appeals which I have above reported upon, I had to deal with evidence bearing on the reports against which the Company had appealed. In connection with the Company's contention, it might be well to bear in mind that the Referees have prescribed long ago the materials other than candles to be used in the testing-places, and have from time to time certified such materials when found to be correct.—A.W.W.

Justice CAVE asked where there was any evidence of hearing behind the back of the Company.

Mr. BOSANQUET replied that that was admitted by Dr. Williamson in his affidavit.

Mr. MACMORRAN pointed out that there were three questions arising upon the facts. With regard to the test which was made in April, he did not understand what the objection of the Company could be, as they themselves supplied the candles which were used for the test. Therefore it followed that, unless it was absolutely necessary that the Gas Referees should stamp and seal every candle or packet of candles, there could be no objection at all to this test. With regard to the second test, the candles used were—whether it was necessary or not—certified by the Referees; but they were not supplied by the Company. The Act required that daily tests should be carried out; and if the Company chose to make default in supplying candles for testing purposes, he submitted that it did not lie in the mouth of the Company to say: "You have used candles which we did not supply." If the Company had come forward and said: "Here are candles which we insist upon being used, and we shall object to your using any others," that would have been all very well; but they supplied nothing, and made no provision. The examiners therefore gave the Company notice that they would use certain certified candles until such time as the Company provided them with others. It was not suggested that the candles actually used were not such as were prescribed by the Act. The only objection was that the Company had not supplied them. By section 32, the Gas Referees were to prescribe the apparatus and the materials, and the Company were to provide them.

Justice CAVE asked as to the penalty clause.

Mr. BOSANQUET referred his Lordship to sections 46 and 50 of the Act of 1875.

Justice CAVE: There is no general provision under which the Company can be fined for not supplying materials.

Mr. MACMORRAN said there was not. He submitted, upon the construction of section 32, that if the Company failed in their duty of supplying materials, they ought not to take advantage of the materials furnished by the controlling authority, unless they could show that those materials were not such as were required by the Act. With regard to the third point—as to Dr. Williamson having obtained information behind the back of the Company—he proposed to leave it to Mr. Sutton to deal with that. But there was one matter to which he thought he ought to direct their Lordships' attention—namely, whether the *certiorari* should be directed to Dr. Williamson at all.

Justice CAVE: What is the effect of the report he made?

Mr. MACMORRAN said that, under section 18 of the Act of 1880, the report was made conclusive evidence against the Company upon a prosecution.

Justice CAVE: It is in the nature of a judicial proceeding; and when made, it is in fact a judgment under which distress could be issued.

Mr. MACMORRAN: If your Lordship intimates that, I do not think I shall care to argue it.

Justice CAVE said he thought the decision of the Chief Gas Examiner was clearly a judicial proceeding. Evidence was required to be heard in the presence of the parties. But this was a matter which was not applicable to lawyers only; the rule applied to all lay arbitrators.

Mr. SUTTON said the facts were now before their Lordships, and he had very little to add on behalf of Dr. Williamson. In his affidavit, he had endeavoured to state exactly what he did, so that the Court might judge as to the degree of irregularity, and to submit himself to the judgment of the Court. It was fully admitted that

Dr. Williamson had taken statements behind the back of the Company. He (Mr. Sutton) did not defend that at all. He thought it a most unfortunate practice that any statement, whether important or unimportant, should be taken behind the back of the parties interested. Dr. Williamson had, it would be seen by his affidavit, made no mystery of the matter at all. It had been his practice over and over again; and in this particular case he not only received a statement from the London County Council without giving the Company the opportunity of making a reply to it, but he also received statements which were volunteered by the Company to him. This was, no doubt, an irregular practice, and could not be defended. The only thing that could be said about it was that it was not a new practice; this being the course which Dr. Williamson had adopted for a great number of years—he having been the Chief Gas Examiner for the Metropolis since 1875. This was how Dr. Williamson dealt with the matter in his affidavit. He said:—

I have frequently found that the statements of facts brought before me at a hearing were not sufficiently clear or complete to enable me to arrive at any definite conclusion regarding the contention of the parties; and I have not infrequently had occasion to refer to one or both parties for further particulars, in writing, of matters of fact beyond those which had been brought before me at the hearing. I have also frequently found it necessary, in connection with the hearing of an appeal, to examine personally the machinery and materials which had been employed in the gas-works, or the apparatus which had been used at the gas-testing place. At the hearing on the 28th of August, 1894, of the Commercial Company's appeals against the report from Wellclose Square, dated the 2nd of April, and the report from Parnell Road, dated the 3rd of May, the Company brought before me statements of a general character, without definite particulars sufficient to satisfy me of the correctness of their conclusions. The gas examiner (Mr. Siddall) who performed the tests at Parnell Road on May 3 was present at the hearing, but did not give evidence as to the candles which he had employed in the tests.

Justice Cave said that would have been very important if this had been a reference by consent of the parties, and the question before the Court had been as to the powers which each party had agreed to give to the referee. But this was not a reference by consent, but by Act of Parliament, to which the Commercial Gas Company were compelled to submit.

Mr. Sutton said Dr. Williamson had added the following, by way of further explanation:—

The Council had given evidence, by their copy letters of the 28th of April, of their intention to supply certified candles for use at the gas-testing stations, and of their actual supply. I could not, however, take for granted that such candles had been used without evidence to that effect. These and other circumstances rendered it necessary that I should have further and precise particulars of the facts bearing on each of the appeals. Mr. Dibdin, the Chemist of the County Council, who acts as Superintendent of the testing-places, accordingly wrote to me a letter, dated the 1st of September, containing evidence as to the fact that the gas examiner who made the test at Parnell Road on the 3rd of May employed in those tests candles which had been prescribed and certified by the Gas Referees; also to the fact that the tests at Wellclose Square on the 2nd of April were performed with candles supplied by the Company such as had been long in use before candles prescribed and certified were supplied to the testing-places. In like manner, the Company communicated to me, as evidence in support of their contention of the illegality of the candles, a letter dated the 4th of September, containing their statements as to a ground of appeal against each of the reports of deficient illuminating power.

Without troubling to read the letter, it would suffice to say that the Company, without the knowledge of the County Council, also fired off to Dr. Williamson a long argumentative statement of their case, which was answered by him.

Justice Cave: Is there any provision as to how the appeal shall be heard? Is there any power to take evidence on oath, or anything of that kind?

Mr. Sutton said the only provision he was aware of was contained in section 12 of the Act of 1880: "If the Company think themselves aggrieved by any report of the gas examiners, they may, within seven days after the date on which that report is delivered to the Company, appeal to the Chief Gas Examiner, whose decision, after hearing the parties, shall be final and conclusive; and the Chief Gas Examiner shall forthwith report every such decision to the controlling authority and to the Company." So what Dr. Williamson had to do was to give the parties a fair hearing; and it could not be contended that, strictly speaking, he was giving either party a fair hearing in receiving communications from the Company which were uncommunicated to the County Council, and in receiving communications from the Council without the knowledge of the Company. It was, no doubt, a practice which might lead to injustice, and was not, therefore, to be defended. There had been but one case affecting the Chief Gas Examiner's powers, and there it was sought to obtain a *mandamus* to compel him to hear Counsel. But the Divisional Court held that he had power, under the statute, to regulate his own procedure.*

Without calling upon Mr. Bosanquet,

Justice Cave expressed the opinion that the objection that evidence had been taken behind the back of the parties affected was fatal to this report. The report was, in effect, a judgment because it was made final and conclusive evidence that the Company had incurred the forfeiture provided by the Act; and the result followed that the report was necessarily of a judicial character. One of the great principles lying at the bottom of all judicial functions was that each of the parties should be heard, and that evidence should be given in their hearing, so that opportunities should be afforded both for publicity and cross-examination. There was not the least ground for supposing that there was the slightest wrongful intention on the part of Dr. Williamson, and both parties appeared to have concurred in this mode of doing business. Consequently, if this had been a consentual arbitration, it would have led to the conclusion that this was done with the consent of both parties. But inasmuch as it was not a consentual arbitration, he did not think the fact that the parties had been in the habit of doing this kind of thing would in any way make it a lawful method of procedure. It was very important that these principles of justice should be adhered to, especially in such a matter as both parties being heard. The Courts had always insisted upon this rule being adhered to by lay arbitrators on all occasions; and that being so, it was fatal to the authority of this report that the principle was not observed in this case. At the same time, he wished to say that no moral blame was to be imputed to Dr. Williamson, who appeared to have merely followed a practice which had been adopted by both parties for some time, but which was really without authority, and consequently vitiated the report.

Justice Lawrance concurred.

The rule was accordingly made absolute.

* See Journal, Vol. LVI., p. 204.

### Claim against the Grand Junction Water Company.

At the Brentford County Court last Tuesday week, before his Honour Judge Bagshawe, Mr. S. H. Moore, of Amyand Park Road, Twickenham, summoned the Grand Junction Water-Works Company for £7 15s., being an amount paid in excess on the water-rate levied by them. Plaintiff's contention was that for a number of years the Company had computed their rate on a higher assessment than that which was attached to his house. He had occupied his house for several years, and had from the first paid a water-rate of £1 19s. per annum. A few years back, however, he succeeded in getting his assessment reduced; but it was only recently that he became aware that the water-rate was being computed on the original assessment in force when he took the premises. He thereupon wrote to the Company, who replied admitting the reduction in the assessment, and stating that in future the rate would be £1 1s. per annum. They refused to make him any allowance on past rates; and he now sued to recover the sum he had paid in excess of his assessment from the time when the assessment was reduced to its present figure. Mr. Acland, for the Company, contended that they had no cognizance of any reductions in assessments until they were brought to their notice; and on the rate demand notes, they had a notice calling on consumers to give them instant information of any alteration in the value of properties supplied with water. As the plaintiff had neglected to comply with this notice, the Company had acted quite legally in making their rate on the old assessment. His Honour said that, in view of the importance of the question, and the issues it raised, he should take time to consider his judgment.

**The Management of the York Street Gas-Works at Leeds.**—One of the Gas Sub-Committees of the Leeds Corporation last Tuesday decided that for the present the York Street Gas-Works should be left in charge of the foreman. Mr. R. H. Townsley, the newly-appointed Chief Clerk and Superintendent of the department (who until recently was Manager at York Street) will still have supervision of the works.

**West's Retort-House Machinery.**—The Gas Committee of the Nottingham Corporation, having inspected West's stoking machinery at the Neepsend works of the Sheffield Gas Company, have decided to introduce machinery at their Basford works, in the retort-house which has recently been remodelled by their Engineer (Mr. W. R. Chester, M.Inst.C.E.); regenerator furnaces and other improvements having been introduced. They have accordingly placed an order with West's Gas Improvement Company, Limited, for a complete installation of stoking machinery, including cannel breakers, elevators, storage hoppers, conveyors, and charging and drawing machines of the compressed air type, complete with air-compressors, &c.; the whole to be completed and in working order for the coming winter. The Manchester Corporation have decided to extend West's method of retort-charging at their Rochdale Road works, and have instructed the Company to convert to their system the hydraulic charging-machines at present in one of the retort-houses.

**London Gas Consumers' Grievances.**—At the meeting of the Paddington Vestry last Tuesday, Mr. R. F. Whur reported that, in conjunction with the Vestry Clerk (Mr. F. Dethridge), he recently attended, with delegates from London and suburban local authorities, at the House of Commons, in order to confer with several Members of Parliament on the subject of the grievances of gas consumers in the districts represented by the deputation. Mr. Whur now stated, for the information of the Vestry, that the Metropolitan Members present at the interview were asked to support a petition to Parliament praying for an inquiry by the Board of Trade, or some independent authority, into the expenditure of the Gas Companies, and into the general administration of their affairs. Until such inquiry was held, it was felt that there would be no adequate redress of the injustice from which it was alleged the London and suburban gas consumers now suffered. The Vestry, by resolution, invited the co-operation and support of all the other Vestries and District Boards in seeking the removal of the grievances complained of. The petition has been presented.

**New Water-Works for Middlewich.**—Mr. J. B. Clarke, one of the Local Government Board Inspectors, held an inquiry at Middlewich last Wednesday, respecting an application by the District Council for permission to borrow £12,000 for a new water scheme. Mr. F. B. Cook, who represented the Council, stated that the present water supply was derived from spouts and wells in various parts of the town; and in the summer time water was often scarce, and much inconvenience was caused. The Council had now entered into an agreement for the purchase of a large plot of land about two-and-a-half miles from Middlewich; and it was free from anything that would injure the water in any way. The lower field covered eleven acres, and the price was £1500; and the upper field, which measured about seven acres, would be £150 per acre. There were several springs in these fields; and the water was very good—the gathering-ground being about 1000 acres in extent. The District Council proposed to collect the water in a reservoir in the lower area; and this reservoir would contain 624,000 gallons, or a ten days' supply. Previous to the water being conveyed to the town, it would be pumped into a tower by two oil-engines. Dr. Fox, the Medical Officer of Health, had stated that the water was of first-class quality. Mr. R. T. Worth, the District Surveyor, stated that 143,000 gallons would pass through the main in eight hours. He estimated that the cost would be £12,000, which would cover everything, and would also include 10 per cent. for contingencies. After further evidence, the inquiry terminated.

# MISCELLANEOUS NEWS.

## COMMERCIAL GAS COMPANY.

The Ordinary Meeting of this Company was held last Thursday, at the Cannon Street Hotel—Mr. J. BLACKETT GILL in the chair.

The SECRETARY (Mr. H. D. Ellis) read the notice calling the meeting; and it was afterwards agreed to take as read the report and accounts, which were published in last week's issue.

The CHAIRMAN said they had the satisfaction of knowing that the Company had been pursuing the even tenor of its way in the useful industry of supplying cheap gas to the consumers, and earning for the shareholders attractive dividends. The accounts did not call for much comment. They had spent £870 more for coal; and they had received £2404 less for gas. This was easily accounted for by the fact that, in the corresponding period of 1893, they were supplying gas at 2s. 9d. per 1000 cubic feet, as against 2s. 7d. last half year; and now it had been reduced to 2s. 6d. On this matter, he thought it was very gratifying to find that they showed an increase of something like 4 per cent. in the consumption. This was particularly satisfactory, because their very large neighbour, who had a district ten times their size, showed a very small increase; and the South Metropolitan Gas Company, who had a district three times the size of their own, and an infinitely superior one, showed an increase of 7 per cent. Therefore he thought they might fairly congratulate themselves upon this point. The residuals had not treated them very well in the past half year. For coke, they received £6000 less. This was to be accounted for by the fact that they were large sellers to the cement people; and he was told the cement trade, like a good many other trades, was not in a very happy condition. Tar had given them £1200 more, which was very satisfactory. Sulphate of ammonia had certainly been a drug; and they had a large quantity at the end of the year which they did not feel inclined to sell, as the market was so low, and which they carried on to the beginning of this year. He understood that in other countries also—for instance, in France—good prices could not be realized for sulphate of ammonia. The result of the half-year's working was that they were able to carry to the profit and loss account a balance of £49,666, as against £59,132 for the corresponding period of 1893. This enabled them to pay a dividend at the rate of 13½ per cent. on the old stock, and 10⅛ per cent. on the new—being ½ per cent. more than the shareholders received last year. The Directors felt that, inasmuch as they made a concession to the public (who were now paying 2s. 6d. per 1000 cubic feet for gas), they might raise the dividend ½ per cent. They really were entitled to another ½ per cent.; but it had been the practice of the Company for some years to keep a small amount in hand; and this ¼ per cent. the Directors proposed putting to reserve, which course, he was sure, would be approved by the shareholders. Possibly the most interesting matter connected with the Company during the half year had been the coin-meter system. They had now 1580 in use in their district. Since the last meeting, they had fixed about 500; and they had plenty of orders on hand. They constantly read in the papers of miserable accidents happening through the very inferior lamps poor people used for petroleum. This showed that there should be some advantage in the coin gas-meters, as they might do away with these unfortunate accidents; and, at the same time, the Company would make a modest profit from them. It was satisfactory to know that they could confer a great boon on the labouring population by means of these meters. There was some talk of electricity in their territory; but he did not think they had much to fear from it. The Whitechapel Board had thought of starting it; but the matter had been thrown out—at all events, for the present. In poor districts, there was not a very good field for electricity. It might be used here and there; but not to any great extent. Cheap oil did hurt them; but with the use of coin meters, they hoped to be able to fight this enemy. Their Engineer (Mr. H. E. Jones) had suggested another scheme of coin meters—shilling-in-the-slot meters, in connection with which they proposed to fix a stove. They thought it was probable that these would appeal to a rather different section of the community than the labouring class. Many people who resided in flats and apartments would possibly be pleased to take shilling-in-the-slot meters; and, as soon as they could obtain them, they would start this business, which, he believed, would be satisfactory. As to their stations, they were all in thoroughly good order; and some improvements were now being made at Wapping. The Company were in a sound, satisfactory position; and if the proprietors would refer, as he had done, to Mr. Field's "Analysis," they would find that, whereas they had a capital of £4 2s. 10d. per ton of coal carbonized, the Chartered Company had £6 8s. 5d., or, per 1000 cubic feet of gas sold, only 8s. 11d., as against 13s. 4d. He thought this was a great element of their success, for which they could not be too grateful. He had only now to allude to domestic matters. The proprietors were all probably aware that, since they last met, their old friend Mr. Robert Jones had died. They would recollect that, at the last meeting, he (the Chairman) told them that Mr. Jones had retired from the service of the Company; and he died at the end of the year, to the regret of all who knew him. Mr. Hunter was elected in his place on the Board. It would also be remembered that Mr. Hammack died just previous to the last meeting; but they deferred, for some little time, electing a gentleman to fill the vacancy. They had now prevailed upon Mr. Frederick Green to occupy a seat on the direction. He thought the Company were to be congratulated on this fact. Their new colleague bore a name well known in the City of London; and he and his family had been connected for many years with a large and prosperous industry in their midst. Therefore he did not think the Directors could have made a better selection than Mr. Green; and, when the time came for his re-election, he believed the proprietors would endorse the policy of the Directors in this respect. He did not think it was necessary to trouble them with any further remarks; and he would therefore move the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. W. G. Bradshaw) seconded the motion.

Mr. E. T. E. BESLEY, Q.C., calling attention to the amount of unaccounted-for gas, said he noticed that over the quantity of gas consumed by "public lights and under contracts" the word "estimated" appeared. He presumed, therefore, that this gas was not measured. The unaccounted-for gas was 80,921,000 cubic feet (which he supposed was something like 14 per cent.); and he wished to know whether some of this was not due to *estimating* the consumption of gas and by the public lamps.

The CHAIRMAN replied that the unaccounted-for gas was only equal to 7 per cent. This to a great extent was owing to the leakage due to the larger amount of gas sent out during the day—there was now a greater demand for gas than there used to be for stoves.

The motion was unanimously adopted.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends at the rates of 13½ per cent. per annum on the old stock and 10⅛ per cent. on the new stock, both less income-tax, were declared.

The Directors retiring by rotation (Sir John Colomb, K.C.M.G., and Mr. J. G. Pilcher) and one of the Auditors (Mr. G. Ilsley) were next re-elected.

Mr. BESLEY, in moving a vote of thanks to the Chairman and Directors, observed that a more satisfactory report had not reached his hands from the Company. It looked as if they were on the up-grade of prosperity; and he thought that, by the next half-yearly meeting, the Directors might be in a position to improve a little upon the dividends which had been declared on this occasion. At all events, he was sure the proprietors all desired to recognize the way in which the Board had conducted the affairs of the Company.

Mr. CECIL seconded the motion, which was unanimously carried.

The CHAIRMAN, on the part of the Board, thanked the proprietors for this kind mark of their confidence. Continuing, he moved a vote of thanks to the officers. He said it was perfectly true that the Directors strove to do their best; and when they enunciated a policy, they carried it forward. But they were dependent upon some 1200 or 1300 good men, who worked for them in various capacities in various places. This vast machine had to be set in motion by a master mind; and they had the great privilege of having one to set it in motion in their excellent friend, the Engineer. No company could be served by a more admirable and accomplished man than Mr. Jones, who had under him very able men all working for the Company's advantage. On this occasion, they must return them a very hearty vote of thanks; for during the past Arctic winter, some of them had had an exceedingly trying time. They had had to be up during the night to keep the gasholders from freezing, and to attend to other duties; and the shareholders saw the result of their labours in the satisfactory accounts before them. They had another official in whom they had the fullest confidence—their able Secretary. He would allude on this occasion to what Mr. Ellis had done (with the approval of the Board, but the work he had carried through entirely by himself)—that was, he had got rid of the fractions of their stock, which was a ticklish and trying thing to do. This would be a convenience to most of the shareholders, and a convenience also in the book-keeping.

The DEPUTY-CHAIRMAN seconded the motion, which was heartily agreed to.

Mr. JONES, in reply, said he was much indebted to the proprietors for their kind vote, which would be especially gratifying to his assistants, who, perhaps even more than himself, had had to deal with the exigencies of carrying on the undertaking during the severe weather. Two—he might almost say three—of their works were inaccessible for the supply of coal, lime, and such necessaries for making gas, for a period of nearly a month. When he said three of the works, he ought to say that they only managed to keep one of them accessible—the Wapping works—by having a steamer lying in a berth near the steam-derrick to dodge the ice until another steamer came to take her place. On such occasions as these, when all the water was cut off, it was also difficult to maintain the action of the plant. It must be remembered that their process demanded the use of water for purification, quenching the coke, and sealing the various vessels, which became almost ice-bound—in fact, they seemed to have been transferred from the moderate climate of London to the Arctic regions. It might comfort the shareholders to know that the use of gas was, to many householders, a large compensation for being kept without a supply of water. He would explain, paradoxical as it might appear, how this came about. He heard someone say to a friend that his family could not have their dinner cooked, because their kitchener was short of water, and they were afraid of an explosion. The other man said: "We got on all right, as we have a gas-stove, which is not likely to blow up through shortness of water. Our water was brought in from the street; and the dinner was cooked by gas." This showed that those who had gas-stoves were rendered partially independent of a water supply. Mr. Besley had, like a certain article they saw largely advertised, put his finger on the spot in asking his question as to the unaccounted-for gas. He (Mr. Jones) might say that the margin between the gas sold and made was never a certain determinable quantity; it depended very much on the output of gas. It would comfort Mr. Besley to know that for many years thay had not returned such a large quantity of gas per ton of coal used as they had done during this very hard season. The excess arose through having made—and they were still making—a larger quantity of gas from the coal than in previous years. He wished Mr. Livesey had been present, because he liked to speak on these questions in the presence of a skilled expert; and he would have confirmed him in saying that there was no subject on which there was less certainty than the margin between the quantity of gas made and sold. Mr. Jones concluded by again thanking the proprietors for himself and his staff.

The SECRETARY also briefly acknowledged the vote; and the proceedings then terminated.

## ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Saturday week—Mr. EDWARD FOTTRELL in the chair.

The notice calling the meeting having been read,

The CHAIRMAN moved the adoption of the report and accounts. Addressing the shareholders, he first expressed regret at the absence of the Secretary and Manager (Mr. W. F. Cotton) owing to ill-health.

Proceeding, he said it gave him very great pleasure to state that they had enjoyed a most prosperous half year, and one which they hoped to see renewed. They had delivered considerably more gas than during the corresponding period of last year. The residual products had also turned out very satisfactorily, having yielded the additional large amount of over £2000. The profit amounted to £43,923; and he thought the shareholders would feel satisfied with the manner in which the Directors proposed to appropriate this. They purposed adding £3000 to the contingency fund, which was a very useful fund in a concern like theirs. There were always things that might come upon them with surprise; and it was hardly fair to put these charges upon a particular half year. During the six months under notice the contingent fund had been reduced by £2200, which was used in part payment for the renewal of one of the large gasholders; and the Directors therefore thought it advisable to add £3000 to the fund in order to keep it up. They also deemed it necessary that the reserve fund should be well maintained. The yield of the coal was very satisfactory, when compared with the corresponding period of the previous year, which, however, was a very exceptional time, as, owing to the strikes, they had to take coal of a rather inferior quality. The deliveries during the past half year had been first-rate; and so they had been able to distribute a considerably increased quantity of gas at a very small increase in expenditure. For the sale of gas they received £111,223 against £113,804; while for residuals the receipts were £25,790, as compared with £23,536. This was a very satisfactory state of things; and it showed that, in residuals particularly, they were wise in putting up works and developing the residuals as an article of commerce. There was only one other matter he might allude to, and that was that, when the public sometimes read the papers, the remark was passed, why could not the Gas Company and the Corporation pull together? He thought it only due to the shareholders that he should explain the position of the Company in regard to the recent action heard in the Court of Exchequer by Mr. Justice Andrews.* The Company's officials had furnished an account to the Corporation for work done by their orders and for their account, amounting to £300 odd, which they asked them to pay, but they would not. They were then obliged to bring the Corporation into Court; and the Company obtained a verdict. He understood that an appeal would be taken; but it had not come on yet. At present the Company were in the enjoyment of the verdict; and he thought they must get the money. There was another matter. The shareholders might have noticed in the *Gazette* that an injunction was sought against the Corporation to compel them to do what they ought to do. At the time the city lamps were sold, there was a meter for every ten lamps; but the Arbitrators in that matter —Messrs. Jones, Shiress-Will, and Harcourt—ordered that properly-regulated meters should be put down, one for every twenty lamps. They had again and again called upon the Corporation to carry out this order; but it had not been complied with. The Directors knew that they were not getting credit for the quantity of gas consumed, as the present meters were defective. Another difference—if he might call it a difference, although he could not see a difference in it—was with regard to the Bill lately promoted by the Corporation. They were prepared to oppose anything connected with the Gas Company in that Bill; for the reason that, in the Act of 1879, a certain class of burner was directed to be used for testing purposes. It was on the basis of that Act that they obtained the money to carry on the business. The Corporation now wanted to substitute another mode of measuring the gas; but he did not think Parliament would attempt to abrogate an Act of Parliament without listening to the parties aggrieved. Therefore, they were prepared to oppose the Bill in the strongest way. However, as he believed the Bill was going to be dropped for the present, he would say nothing further on the subject.

Mr. J. R. WIGHAM seconded the resolution, which was adopted.

On the motion of the CHAIRMAN, seconded by Mr. C. LAWLER, J.P., a dividend at the rate of 10¼ per cent. on the old shares and 7½ per cent. on the new shares was declared.

The retiring Directors and Auditor having been re-elected,

Mr. BROOKS proposed a vote of thanks to Mr. Fottrell for presiding, and bore testimony to the way in which he discharged his duties as Chairman of the Company.

Mr. KENNY seconded the resolution.

Mr. WIGHAM, in putting the resolution to the meeting, said, with the sanction of the shareholders, he would include their thanks to the officers of the Company for the way in which they had seconded the efforts of the Board in promoting the interests of the Company. The shareholders were especially under an obligation to the engineering staff.

The resolution having been adopted and acknowledged, the proceedings terminated.

## EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Assembly of the proprietors was held last Thursday at the Offices, 16, St. Helen's Place, E.C.—Mr. GEORGE BANBURY presiding.

The SECRETARY (Mr. I. A. Crookenden) having read the notice convening the meeting, the report of the Directors and the accounts, of which a summary appeared in the JOURNAL last week (p. 710), were taken as read.

The CHAIRMAN said it had doubtless struck the proprietors, when reading the report, that the increase in revenue was not quite so much as usual; but this was owing to their having to make the comparison with the unusually favourable half year of 1893, when their receipts happened to be increased, among other items, by a very enhanced sum for the road-watering, owing to the dry season of that year. If, however, they compared this increase with that of the average of the last three corresponding half years, they would find it was very good, amounting to £3751; and if they took the three last entire years, they would see that the increase last year was £6058. The income derivable from the 2058 houses they had newly supplied during the past six months averaged £1 3s. 5d. per dwelling, against £1 1s. 8d. for the 1999 houses they connected with their system in the corresponding period of last year. This indicated that some improvement was going on in the class of houses now being erected in their district. With the exception of rates and taxes, there was a good decrease this time under the head of "maintenance," amounting to nearly £3000; and this was notwithstanding that they had had to make some necessary repairs to the deep-well pumps at Waltham Abbey. These pumps and the engine had, however, worked so satisfactorily for many years that they did not in the least begrudge this outlay. There was a considerable diminution in the expenditure under the head of filtration, because, having expended about £5000 during the previous year in the purchase of sand, there had been no occasion to make any outlay of this kind in the period under review. Rates and taxes showed an increase of £1134 during the half year. Altogether they paid £28,000 a year for rates and taxes; but they did their best to keep them in check. The law charges were increased by £700 through having to oppose the Thames Conservancy Bill last session; but the Company obtained something in return, as the extra contribution of £14,000 which the Bill proposed should be paid by the Water Companies was reduced to £7500. There were some other alterations in their favour; and they managed to obtain a seat for a representative of the Water Companies on the Thames Conservancy Board. As regarded the new works, they might remember that the Company's Bill of last year was vigorously opposed; but the Parliamentary Committee were so convinced of the reasonableness and necessity of their proposals for extending the undertaking, that the following somewhat unusual provision was put into the Act as it now stood: "Provided always that the additional filter-beds and works for improved filtration and storage shall be commenced as soon as practicable after the passing of this Act, and be prosecuted with all due diligence." These special works comprised the two new reservoirs at Walthamstow, which would give them a water area of 80 acres; the raising of the embankments of the old Racecourse reservoir, which would give them an additional supply of 150 million gallons; and the construction of two high-service covered brick reservoirs, one at Buckhurst Hill and the other at Hagger Lane. All the works now being constructed were in the Essex district. The new filter-beds referred to had been completed, and the filtering medium was now being placed therein; so that before long they would be actually at work. Tenders had been accepted for the new reservoirs, the covered brick reservoirs, and likewise for the other works mentioned; so that, in the words of the Act of Parliament, the new works would now "be prosecuted with all due diligence." Respecting parliamentary matters, the proprietors had doubtless followed the course of the Bills brought before Parliament for the compulsory transfer of the undertakings of the Water Companies to the London County Council; and they would also have received a detailed statement of the objections to these Bills from the Companies' point of view. He would therefore merely mention how matters now actually stood. The Bills for the compulsory acquirement of the undertakings of the Southwark and Vauxhall and the Lambeth Companies were read a second time on Feb. 22 last; and those for the similar acquisition of the other Companies were down for second reading on the 3rd prox. The Bills already passed were to be referred to a Select Committee of nine members—four to be nominated by the House and five by the Committee of Selection. All the other Water Companies, the Corporation, the County, District, and Urban Authorities concerned were to have a *locus standi* before the Committee upon these two Bills. The Companies had thus an opportunity of setting forth any objections which they might consider prejudicial to their interests. It was also arranged in the House that the other six Bills should be proceeded with; so that the two Bills which had already gone to Committee should not be used as a means of prejudicially affecting the interests of the other Companies. In an important inquiry of this kind, involving such vast interests, the Committee might adopt a line of action totally at variance with that proposed by the London County Council. From the tone of the debates, both on and after the second reading, they might hope the Committee would recommend a policy and a scheme more statesmanlike, more workable, and more equitable than the crude, immature, and unfair course advocated in the Bills as they now stood. As regarded their staff, Mr. Bryan had lately had to bear far more than his usually heavy share of work. The preparation of all the necessary plans, specifications, and details for the construction of the new reservoirs, and the almost overwhelming task he had had in order to meet the great troubles owing to the late frost, had given him additional duties to those which were already sufficiently onerous; but Mr. Bryan had been equal to the occasion. The work of his staff had been unceasing in all the late frost troubles. He (the Chairman) had on former occasions brought to their notice the talent and tact with which Mr. Crookenden managed his important department. Many matters were disposed of by the Secretary from day to day which would give them considerable trouble unless he settled them fairly and equitably. Mr. Crookenden had given them a great deal of help during the late parliamentary inquiry; and he was most happy to think that they would have the benefit of his experience and judgment during the present session. One circumstance had been consoling and gratifying to them during their late troubles. Of course, Mr. Crookenden received innumerable letters upon this subject; but they were not all upbraiding and vituperative. He received some thanking them for their efforts in mitigating and alleviating the inconvenience; others expressing regret for harsh language used in angry moments; and some sympathizing with them when the writers began to appreciate the overwhelming difficulties which the Company themselves had to encounter. Though the question of the late frost did not really appertain to the six months they were now considering, still as it had been a matter of so much interest and discussion, they would naturally expect him to refer to it. If they had not already read the leading article in *The Times* the previous day, they should certainly do so, as it put the subject of frozen pipes most fairly, clearly, and ably before the public. When he addressed them a year ago, he expressed the gratification of the Directors that they had only had a few days' frost during the then past winter; and he added: "A frost to us is a most troublesome and expensive business, and an open winter is as much a subject of congratulation to us as to river navigation and to canal companies." This year the state of affairs was altogether changed. They had experienced

* See JOURNAL, Vol. LXIV., p. 1169; and *ante*, p. 373.

a frost of unusual severity and duration, to find a parallel for which they would, he believed, have to go back as far as 1813. The private communication-pipes from the mains to the houses, and the unprotected pipes and cisterns in the houses themselves, were the first to freeze. Then some of the smaller service-pipes gave them considerable trouble. In some instances, the chill caused by the low temperature of the water passing through contracted the metal; and the pipes split vertically, as if cut with a knife. As regarded this matter, the depth at which the pipes were laid of course made no difference, for the same thing would happen. Again, when these small mains ended in a plug or hydrant, the flow was stopped by the communication-pipes to the houses being ice-bound; and thus the water became stagnant and susceptible to frost. They at once set to work to ameliorate all these evils, and spared neither trouble nor expense with this object. They also put up as many stand-pipes as could be obtained, as their stock on hand had run rather short. They employed extra hands without stint; and all the parish water-carts were engaged at the cost of the Company to carry water about to those who wanted it. He must say it was rather hard to find that, when they were doing everything they possibly could to improve matters, they came in for abundant abuse and invective. In one or two instances, writers went so far as to say that "water company shareholders must be having a fine time owing to the frost, as they pumped no water and collected their rates all the same." He could hardly think that these writers were really ignorant of the fact that the greater the frost, the greater the pumping. During the height of the late severe weather, they pumped above 70 million gallons a day, or about 60 gallons per head of the population. This was mainly owing to the waste caused by the consumers letting their taps run day and night. He might say that a single half-inch pipe running full bore for 24 hours would waste as much water as would supply 700 persons. When sending out this vast volume of water, their engines worked admirably. There was not the slightest hitch; and their resources of supply being then opportunely abundant, they were equal to the demands made upon them. Although they had to remove many thousand tons of ice from their filter-beds, the filtration was somewhat facilitated by the water from the reservoirs being so remarkably clear; whereas had there been matter in suspension, they would have had macintosh-like layers of deposits all over the filter-beds, greatly interfering with their task. The proprietors would doubtless have read that, in many towns where the water supply was under the corporations or municipalities, and had in some instances been so for many years, the same difficulties and inconveniences were experienced during this memorable period. Complaints were numerous in Leeds, Manchester, Nottingham, Sheffield, Glasgow, Edinburgh, and Brighton; and, in many cases, the inhabitants were warned to be sparing in the use of water, as the supply would not otherwise hold out. He also gathered that stand-pipes and other appliances for lessening the annoyance were not so readily furnished as they were in London. In connection with this matter, he might quote the following from the *Engineer*: "It has been said with clamour that, if only the County Council had had the control of the water supply, there would have been no trouble. It is a pity that those who enjoy facilities for making their views public are not more careful in obtaining information concerning facts. In Liverpool, there is no water company; and there are over 3000 fractured mains. In Birmingham, Leicester, and Nottingham, there has been a very serious interruption in the water supply. In Sheffield, it is estimated that 150,000 persons have been left dependent on water-carts for their supply. In Leeds there has been a virtual water famine; and the utmost that the Corporation seemed to be able to do was represented by the posting of placards all over the town threatening householders with a fine of £5 if they left a tap running to prevent freezing, and the inspectors made domiciliary visits in order that the placard should not be a dead letter. On the whole, the London Companies have done better for their customers than the Corporations or Town Councils have done for those whom they undertake to supply. This fact ought to be borne in mind." The Company's district inspectors, foremen, turncocks, and trenchmen worked with great energy and zeal; and they would take care that these services were not forgotten. They had several hundred extra hands to help them; but the main burden of the work fell upon their own men, owing to their local experience and to their full knowledge of their duties. Of course, the expense of all these frost troubles would be very serious; but it was essential that they should do all they could to help their customers, who, nevertheless, were in many cases wasting the water most relentlessly, as he had stated. They would not know the actual cost for some time; but it would represent a very heavy demand upon their exchequer. A good deal had been said as to the depth at which the pipes were laid. For years past the Company's mains and services had been laid at a full depth of 2 ft. 6 in.; so that consumers could fix their leaden communication-pipes at the statutory depth, if they only thought proper to do so. Still, as pointed out by Mr. Fraser, the Engineer of the Grand Junction Company, they were greatly at the mercy of the parish authorities in this matter, as the latter raised or lowered the surface of the road without considering anything about the water-pipes; and they also cut deep kerb channels, thus reducing the depth of the material just above the communication-pipes. However, depth was no specific prevention against frost. Local surroundings had a good deal to do with it, as in some cases service-mains laid at 3 ft. 3 in. froze, while others at 2 feet were free. All their large mains were always fully charged; so that the fire-hydrants were available throughout. There was no doubt an eventful period before them; but he thought from the tenor and course of the late debate in Parliament, and from the opinions of the Press on that debate, they might reasonably anticipate fair and equitable treatment when the purchase of their undertaking was finally decided upon. Again, they must bear in mind that, whenever they had had a chance of fairly putting their case before a competent tribunal, they had always done well. Thus, in the cases of the Duke of Richmond's Commission, of Sir Matthew White Ridley's Committee, of the Royal Commission under Lord Balfour of Burleigh, and last of the important inquiry into their Bill of last year before Sir Joseph Pease, the results were all favourable to them. He hoped that similarly favourable results might be awaiting them in the future. He concluded by moving—"That the Directors' report and accounts submitted to the meeting be received and adopted, and that, as recommended by the Directors, a dividend at the rate of 8 per cent. per annum (less income-tax) for the half year ending Christmas, 1894, be declared."

Mr. H. DALTON seconded the motion.

Mr. W. S. CUFF called attention to the waste of water caused by what he termed imperfections of the Company's own fittings during the late frost. The water thus wasted froze, and caused danger to the public and expense to the ratepayers in removing the ice.

The CHAIRMAN, in reply, stated that, if the stand-pipes were perfectly water-tight at the taps, they would freeze at once, and become useless for the purpose for which they were put up. As regarded the ice, they could not help it, and people wasted a good deal of water when they went to the stand-pipes and filled their cans.

The ENGINEER (Mr. W. B. Bryan) said hundreds of the County Council hydrants, which were perfectly water-tight, burst through being frozen; and some of them were actually out of use at the present moment.

The resolution was unanimously adopted, and the retiring Directors and Auditor were afterwards re-elected.

The proceedings then terminated.

## THE LIVERPOOL CORPORATION AND THE GAS COMPANY.

### The Public Lighting Question—The Testing of Gas—The Suggested Reduction of the Illuminating Power.

It was reported at the meeting of the Liverpool Corporation Lighting Committee yesterday week, that the following agreement had been provisionally made between the Committee and the Gas Company: "(1) That the price to be paid by the Corporation for gas supplied to the street-lamps from the 1st of January, 1895, shall be 10 per cent. less than the price charged for private consumption. (2) That the Corporation shall not require the Company to provide any additional testing-places under the Company's Act of 1865, or take any steps to have official tests made under that Act; but that the gas examiner of the Corporation may from time to time send to the Gas Company a record of the results of tests made by him by means of a portable photometer, and that if those tests show that the gas at the time and place of testing was under the standard power and purity, then the Directors undertake to thoroughly investigate the matter, and use every endeavour (if they find reason to think the tests were correct) to remedy the defect for the future. (3) That the Lighting Committee, having passed a resolution expressing a desire that the Directors of the Company should consider whether or not it would be in the public interest that the standard candle power of the gas and the price should be lowered, the Directors are prepared to confer with the Committee on the subject, or to consider any proposals that may be made by the Lighting Committee." After some discussion, the Committee decided to confirm the terms of the agreement.

At the meeting of the Liverpool City Council on Wednesday last, Alderman F. Smith, in moving the adoption of the proceedings of the Lighting Committee, said they were very glad to be able to report to the Council that they had come to some understanding with the Gas Company, which was not only in the interest of the Corporation, but in that of the citizens. It represented a concession of £2113 9s. 7d. per annum; and therefore he thought they had good reason to be very pleased at the way in which they had been met by the Gas Company. Mr. Beloe asked if there was any truth in the complaints which had been made as to the harsh way in which the Corporation treated the lamplighters. Alderman Smith replied that the matter had been considered by the Committee; and their opinion was that there was no ground for the statements which had been made. Some considerable saving had been effected by the reduction of the lighting; and under the present system, the men were able to light 100 lamps, as compared with 80 formerly. Each district was laid out on the assumption that a man would walk four miles an hour, and that he took ten seconds to light each lamp. The average wage paid by the Corporation was 26s. 6d. per week, as against 23s. under the old system. The proceedings of the Committee were confirmed.

## THE NEWCASTLE-UNDER-LYME GAS DEPARTMENT.

### The Report of Messrs. Lass, Wood, and Co. on the Accounts.

It will be remembered that a few months ago there were some rather acrimonious discussions in the Newcastle-under-Lyme Town Council regarding the management of the Gas Department, and the manner in which the books were kept. These resulted in the appointment of Messrs. Alfred Lass, Wood, and Co. to investigate the accounts for the years 1893 and 1894. They have completed the examination; and at last Tuesday's meeting of the Town Council their report was presented. With reference to the specific questions submitted for their consideration, they stated: "(1) In our opinion, the officials of the Gas Department were not responsible for the delay in the final preparation of the accounts for the year ended March 31, 1893, or for the year ended March 31, 1894. (2) There has been neither dishonesty nor unfaithfulness on the part of the officials of the Gas Department; all moneys received by them having been duly and properly accounted for. We are also further of opinion (3) that the Auditor has earnestly endeavoured to discharge the duties which devolved upon him, and has spent much time in attempting to make the books represent the true state and condition of the affairs of the Gas Department; but in our opinion such books did not show the true state and condition thereof, either on March 31, 1893, or on March 31, 1894. In these circumstances, it became necessary for us to reconstruct the accounts; and such reconstructed accounts have been entered in a new impersonal ledger and journal opened for that purpose." Alderman Briggs, the Chairman of the Gas Committee, thought the report should be considered at the earliest possible moment. They must bear in mind that the Gas Department had been the subject of very outrageous charges for the past two years. He urged that members should be more careful

in the future than they had been in the past with regard to the statements made by them in the Council. The figures proved conclusively that the actual profit on last year's working on the capital expended was 6½ per cent.; and he believed that, if they were to sell the undertaking, they would make a profit of £30,000. It was agreed to call a special meeting of the General Purposes Committee to consider the report.

## THE GOUROCK GASHOLDER INQUIRY.

### Dispensing with Consent.

In the Sheriff Court at Greenock, on Monday, the 1st inst., Sheriff CHEYNE, as Sheriff of the County of Renfrew, conducted an inquiry under the amendment to the Burghs Gas Supply (Scotland) Act, 1876, which was made by an Act passed in 1893 at the instance of the Gourock Gas Commissioners. By the 18th section of the Act of 1876, it was necessary, before erecting any works for the manufacture or storage of gas, that the promoters should obtain the consent of all the owners and occupiers of dwelling-houses within 300 yards of the proposed site. The Commissioners of Gourock some years ago purchased a piece of vacant ground in Royal Street, within about forty yards of the gate of the gas-works, but approached by a longer route; the side next the works being already built upon. As, however, the owners and occupiers of the houses in the neighbourhood refused to give their consent to the erection of the gasholder which the Commissioners proposed to place on the ground, the Commissioners applied to Parliament, and had the Act of 1876 amended to the extent of the Sheriff of the county being empowered to take evidence, and to issue an order, if so advised, finding that consent could be dispensed with. Having obtained this power, the Commissioners presented a petition to the Sheriff, asking him to hold an inquiry, and to dispense with the consents. Objection was offered to the petition by owners and occupiers; and the Sheriff ordered them to lodge formal objections to the petition, and gave the Commissioners an opportunity of answering them.

The objectors stated that it was not necessary to increase the storage accommodation; that the land upon which it was proposed to erect the holder was situated in a densely populated and central part of the burgh; that it was within 200 yards of the railway station and the pier; that it fronted a main thoroughfare, and was surrounded on all sides by dwelling-houses, which were let at good rents, and occupied by a superior class of tenants; that within a radius of 300 yards there were about 700 dwelling-houses; that the population in the district was largely increased by visitors during the summer months; and that in terms of their feus, the feuars in Royal Street were bound to erect dwelling-houses of certain descriptions only. They also pleaded that the holder would be a nuisance, and would depreciate the value of property in the neighbourhood; that it would involve the expenditure of a large amount; that further accommodation could be had for a less sum; and that they saw no reason why the Commissioners should not get an additional supply of gas from the Corporation of Greenock.

The Commissioners in their answers said that a number of the objectors lived in houses which were as near the gas-works as they were to the site of the proposed gasholder; that the site was the most open that could be named within the burgh; that the holder would be of such design, and the land laid off in such a manner, as would improve the amenity of the neighbourhood; that gas could not be procured from Greenock at a lower price than they could manufacture it themselves; that the Act of 1876 gave them no power to purchase gas from any other gas authority; that, in any event, to purchase gas would be to decrease the output at their works, and increase the cost of producing gas therein; and they denied that the holder would be a nuisance.

The Sheriff in the morning visited the site of the proposed holder. When the Court sat, the Gas Commissioners were represented by Mr. J. GLEN, Town Clerk of Gourock; and the objectors, by Mr. R. S. MURRAY, Writer, of Greenock.

Mr. *James M'Ewan*, Manager of the gas-works in Gourock for the past 32 years, said he had been engaged in gas manufacture for 47 years. The gas undertaking was acquired by the Corporation in 1886. At that time, the gas manufactured was 9,080,000 cubic feet a year; while during the year ending in May, 1894, it was 50,965,000 feet. The quantity sold during the year was over 40 million cubic feet. He attributed the increase in the consumption of gas to the growth of the population following upon the railway to the town being opened in 1889. Attention was called to the necessity for increasing the storage accommodation in the beginning of 1892. Mr. M'Gilchrist, of Dumbarton, was consulted; and he recommended that a new gasholder should be erected. Mr. Darroch, of Gourock, intimated that he would not give them unfeued land for the purpose until he was satisfied that feued land could not be got. They were working under disadvantages, on account of the want of storage. On several occasions during the winter months they had nearly exhausted their supply; being within about an hour's consumption. Their total storage accommodation was 40,000 cubic feet; and their average daily consumption in January of this year was up to 80,000 cubic feet, while during the winter they were running, off and on, from 70,000 to 80,000 cubic feet. The proposed gasholder would contain about 120,000 cubic feet. He thought the site was the most eligible one obtainable; for they had no space to erect a holder inside the works. The site was near to the works; and they would not require to keep anyone in charge of it, as they would if it were some distance away. He had no reason to suppose that the holder would be offensive to any of the inhabitants of houses in the neighbourhood. So far as health was concerned, he could only say that, in his experience of 47 years, he had been free from all the prevailing epidemics. He did not know what the Greenock Corporation might sell gas to them for; but he did not think they could afford to do so at 2s. 8d. per 1000 cubic feet, which was 6d. below their current price. In Gourock, during the year ending in May, 1894, the price of gas delivered into the holder was 2s. 0¾d. per 1000 cubic feet; the loss per 1000 cubic feet was 2½d.; the cost for distribution was 6d.; and they had charges for interest upon loans amounting to 1od. This made the total cost of gas sold 3s. 7¼d. per 1000 cubic feet. Supposing they got gas at 2s. 8d. per 1000 cubic feet, they would still have the 2½d. as the amount of loss by leakage; and they would have the same expenses for distribution as at present, which would be 8½d. Then they would also have the charge of 10d.; and these additions would raise the price of gas to 4s. 2½d. per 1000 feet, whereas they could supply it for 7d. less. He was aware that it was a condition that the holder should be made ornamental.

In cross-examination, witness said the cost of a main from Greenock might be about £700. The estimated cost of the gasholder was about £5000, of which about £2000 might be allowed for the ground and expenses.

Re-examined: When the Commissioners acquired the works, the price of gas was 4s. 7d. per 1000 feet. It was now 3s. 7d.; and they had struck off meter-rents. They had also spent abont £2800 upon improvements.

The SHERIFF: I do not think I should inquire into whether the Gourock Commissioners require to provide more storage for gas; that is a question for them. What I have to do with is whether they should get that storage at this place.

Mr. *James M'Gilchrist*, Engineer and Manager of the Dumbarton Gas-Works, said he examined the Gourock Gas-Works in 1892, at the request of the Commissioners; and he reported, among other matters, that the gasholder accommodation was only about half of the maximum consumption during the winter. He thought the holder would not be an eyesore, as it could be made ornamental. The site was well adapted for the purpose; and he could conceive of no danger whatever in having it there. He never heard of an explosion of a gasholder. If properly constructed, there would be no more smell from the holder than there would be from a bottle which was properly corked. There was not an explosion of a gasholder in Glasgow. There was an explosion of, he thought, dynamite, and the escaping gas burned away.

Mr. *Robert Mitchell*, Engineer and Manager of the Edinburgh Gas-Works, thought it was absolutely necessary that more storage accommodation should be provided. The proposed site was a suitable one. In the city of Edinburgh, they had ten holders at three different sites. Two of the largest were constructed near the Queen's Park. They could be seen from the windows of Holyrood Palace; and there never had been any complaint on account of them by the inhabitants of the Palace. There were five holders at Tanfield, in a high-class residential locality. They had holders with dwelling-houses near to them; and they never had any complaints from the inhabitants. So far as safety to property was concerned, he should prefer a gasholder to a stable.

Mr. *A. MacPherson*, Manager of the Kirkcaldy Gas Works, said he considered the site an excellent one. At Kirkcaldy, the gasholders were surrounded by dwelling-houses; and some of them were nearer the holders than was proposed here.

Mr. *W. Steel*, builder, of Greenock, said he was an owner of house property in both Greenock and Gourock, and had been a Commissioner of Gourock for eight years. When they applied to Mr. Darroch, of Gourock, for land upon which to erect a gasholder, he declined to give them unfeued ground, because he objected to the works being dissipated all over the burgh. Five sites were reported on and considered by the Commissioners; and they selected this one as being the most suitable. He was a proprietor in the neighbourhood; and he did not object to the holder. At present, the ground was very unsightly. It was proposed to erect stabling and other town offices next to Royal Street; and the gasholder would be in the space behind.

Captain *Biggs* and Mr. *Jamieson*, owners of property in the burgh, also supported the view of the Commissioners.

For the objectors, Mr. MURRAY said he intended to have called as witnesses the Town Clerk of Greenock and ex-Provost Wilson, of Greenock; but they were both away at a water-works inspection.

Mr. *G. Edmiston*, a heritable creditor in possession of property in the neighbourhood of the site, said he thought the holder would be a nuisance; and his tenants had threatened that, if it was erected, they would leave. He considered it would be a source of danger. He was aware there had been two explosions in Glasgow. If this holder were erected, his property would practically be in the centre of a gas-works. At present it was close to the works; but the erection of a holder would interfere with the view from the windows. He thought there would be a smell from the gasholder.

Several witnesses then gave evidence that their property would be prejudicially affected by the erection of the proposed holder, inasmuch as it would be an eyesore, and would cause objectionable smells.

Mr. GLEN submitted that the holder was a necessity for the public convenience, and that it had not been shown that it would injuriously affect property.

Mr. MURRAY pointed out that within 300 yards of the proposed site 740 people, among whom there were 139 proprietors, objected to the holder; and there were only 101 consents. It was therefore pretty clear that, so far as the people living in the district were concerned, there was a consensus of opinion that the holder should not be erected there. He submitted that other sites might be obtained.

The SHERIFF asked Mr. Glen to put in a minute undertaking that the site should not be used for any other purposes than storage; and Mr. Glen undertook to do this.

The SHERIFF, in giving judgment, said: The question is whether I am to authorize the erection of this gasholder on the site proposed by the Commissioners, although many of the owners, and some of the tenants of the houses within 300 yards of it object to its erection. The objections seemed to resolve themselves into three: First, that the holder would be unsightly. We all know that a gasholder is not a very beautiful object; but I do not think that is one of the reasons that the Legislature had in view when they sent this question to the Sheriff. There are other things which are hideous besides gasholders; and there is a possibility that even a still more hideous thing than a gasholder might be erected on this ground. Then it is said, in the second place, that there might be a danger in the erection of this holder. I am decidedly of opinion, on the evidence, that there is absolutely no danger whatever from a gasholder. It appears to me that there is a material distinction between a place where gas is manufactured and a place used simply for the storage of gas. In the process of manufacturing gas, it is inevitable that there should be a certain amount of

disagreeable smells, that some offensive fumes should be given off; and if the Gourock Commissioners had been proposing to use the site in question for manufacturing gas, I would without any hesitation have refused to grant their present application. They have, however, disclaimed all intention of using the ground for purposes of manufacture; and all that they propose to do is to erect on it a new gasholder, which, seeing that their present storage accommodation is sufficient for little more than half-a-day's consumption, they are manifestly greatly on need of, but which they cannot for want of room put up in the ground occupied by their gas-works. Now, a gasholder is certainly not an ornamental object; but I am satisfied from the evidence which the pursuers led before me, and which was entirely uncontradicted, (*a*) that there is no danger whatever to anyone from its vicinity, and (*b*) that if it is properly constructed there is no more smell from it than there is from an ordinary gas-pipe. The expert witnesses concurred in stating that, with the exception of one case, in which the explosion was the result of a criminal application of dynamite, there has not been a single instance of a gasholder exploding. It was urged on behalf of the objectors that, granting that there is no real danger and no real risk of smell, tenants will nevertheless be deterred from taking houses in proximity to a gasholder; and that consequently the erection of such a thing must depreciate the value of property in the immediate neighbourhood. It is, however, in my opinion a conclusive answer to this argument, so far at least as the present case is concerned, that the whole of the objectors' properties are much less than 300 yards from the existing gas-works—to which some of them, indeed, are closer than they will be to the new gasholder—and that they appear not to have suffered from such proximity, but are all fully let.

His Lordship accordingly granted the petition. He thought, however, it was not a case for expenses.

## ELECTRIC LIGHTING NOTES.

On the evening of last Friday week, a mishap occurred with the electric lighting plant of the Cardiff Corporation—resulting in all the lights in the streets being extinguished for about a quarter of an hour. Fortunately, most of the gas-lamps in the shops were alight.

The members of the Worcester City Council last Tuesday had another long discussion regarding the contractors' bill for "extras" in connection with the electricity works, amounting to between £4000 and £5000. The Electricity Committee, to whom the matter was referred back at the former meeting, again recommended the adoption of the Sub-Committee's report involving the payment of the bill, and an expression of regret that the Committee were not informed by the Engineer of the extras being incurred before he signed the certificate. They had considered the legal position, and were advised that they must pay the amount. Much discussion took place as to the responsibility or otherwise of the City Engineer in the matter. Ultimately the Council accepted an amendment by a majority of one vote, adopting the report without expressing any opinion as to the Engineer's position.

Alderman Pirrie was questioned by Mr. Masterson at last week's meeting of the Belfast Corporation as to the position of the electric light undertaking. He stated in reply that there were 4200 lamps actually on supply; and applications for an additional 1000 were under consideration. The average total cost of the supply for nine weeks was £26 10s. 2d. per week; and against this there was an income of £27 15s. He thought this was very gratifying, considering the short time the works had been in existence. The total estimated supply was 8500 lamps. But their capacity was beyond that; and they were anxious to have the works tested to the utmost. Mr. Masterson considered the statement very satisfactory.

The Torquay Town Council had before them last Tuesday a report by Mr. W. H. Trentham on the lighting by electricity of the Bath Saloons and three of the most frequented thoroughfares. The report stated that 2442 yards of underground main and 40 arc lamps would be required; and the cost of the plant would be £4900. The annual working expenses, assuming that the arc lamps were extinguished at 11 p.m. would be, including interest and sinking fund at 5¾ per cent. for repayment in 25 years, £728. Mr. Trentham said he had gone carefully into the cost of gas which would be saved by the use of electricity, and, on the basis of what was actually now being paid, he found it amounted to £368 per annum—the nominal candle power of the gas-lamps being 2300, against 40,000 given by the arc lamps. This amount (£368) deducted from the total expense of running the electric light plant (£728), showed that they would incur an increased expenditure of £360 per annum. It was suggested that the installation should be somewhat increased; sufficient machinery being provided to maintain 800 16-candle power lamps in addition to 40 arc lamps. The total outlay would then be £7986; and the annual cost of working the installation would be £1138. On the other hand, there would be a revenue of not less than £866 from the private incandescent lighting at a charge of 6½d. per unit, which, he asserted, was practically equal to 3s. 3d. per 1000 feet for gas. There would then be on the credit side the following amounts: Saving in gas at the Bath Saloons, £88; saving in lamps replaced by arcs, £156 11s.; saving in pier and gardens, £124; private lighting, £866—total, £1234 11s., showing a net profit of £96. Alderman Kerswell moved that the report should be referred to a committee; and the motion was passed.

The Sheffield Electric Light and Power Company, Limited, have been in existence for two years and nine months; and the Directors consider that the progress made has been encouraging. According to the accounts, the net profit for 1894 was £1943; and adding to this the balance from 1893 (£585), and the balance of suspense account (£147), makes £2675. This the Directors have decided to dispose of as follows: To payment of debenture interest, £691; to writing off proportion of formation expenses, £202; and to transfer £1250 to depreciation fund—leaving £531 to be carried forward. In view of the substitution of underground mains for those overhead, it has been considered prudent to set aside the substantial sum of £1250 to provide for this and any other depreciation. The gross revenue from the supply of current increased during the year from £3555 to £4849. At the end of 1892, the number of lamps (8-candle power) wired was 7734; at the end of 1893, it had increased to 8419; and at the end of 1894, to 15,672. The capital expenditure during last year amounted to £17,251, as against £19,689 in 1893. No dividend has yet been paid, and further capital outlay is contemplated; so that for the present the shareholders must be content with the assurance of the Chairman (Alderman G. Franklin) that "the future of the Company is an encouraging one." At the meeting of the Company last Wednesday, the Chairman in the course of his address, dealt with the question of explosions in electric light boxes. He asserted that their system was not the same as that in vogue in those places where these accidents had taken place. At the same time the Directors felt with the Gas Company that the safety of the public was a matter of great importance, and that it was only right they should have the street boxes tested and ventilated from time to time in order to avert the possibility of danger in that direction. When they had done this, he thought it would be conceded that the Company had done their best, and that it remained with the Gas Company to reduce the enormous leakage of gas under the streets. In considering the question of electric light, and its competition with gas, he said it must be remembered that the electric light in its infancy was competing with gas in its old age. To-day gas was something like 2s. 2d. per 1000 cubic feet. But if they looked back to the earlier stages of gas companies, they saw that in London in the year 1815 the price of gas was 15s. per 1000 cubic feet; in 1832, it was 12s.; in 1843, 8s.; in 1848, 6s.; in 1853, 4s. 6d.; in 1862, 4s.; and by reductions of a penny, it gradually came down to present day prices. One of the disadvantages which the Electric Light Company had to deal with would disappear if the "load" were more evenly distributed throughout the 24 hours of the day. Referring to these remarks, one of the shareholders (Mr. G. Senior) stated that he had drawn a comparison as closely as possible between the prices both at his house and at a certain portion of his works; and as near as he could tell the price of the electric light was about 50 per cent. more than gas. But when they took into consideration the question of health and of cleanliness, the electric light was cheaper than gas. The proposals of the Directors as to the disposal of the profits were adopted.

The propensity of the electric light for collapsing at the most inconvenient time was once more illustrated on Sunday evening last week. In this instance, Bristol was the scene of the accident; the breakdown occurring on one of the circuits, and resulting in some of the churches which depend upon electricity for illumination being deprived of light from this source. The services had to be conducted in semi-darkness; a few candles having to suffice to lighten the obscurity enough to enable the clergy and choirs to read.

The Southport Corporation electric lighting works, which were put into operation last November, already require considerable extension; and for this purpose the Town Council lately applied to the Local Government Board for enlarged borrowing powers. Mr. Rienzi Walton held an inquiry respecting the matter last Wednesday. He was informed that the present borrowing powers amount to £28,000, of which the Corporation have already expended £18,746; leaving a balance of £9254. Already 2000 lamps more than the generating plant can really supply have been wired; and the Electric Lighting Committee are proposing to extend the buildings and power of the station to meet the growing demand, and to enable them to tap the residential district of Hesketh Park. The cost of this work is estimated at £21,250; and over and above the balance in hand, they wish for power to borrow £12,000, in addition to £3500 for street arc lighting—making £15,500. There was no opposition.

The Electric Lighting Committee of the St. Pancras Vestry cannot be induced to submit a financial statement; and the indignation of the ratepayers found expression on Monday last week, at a meeting of the Ratepayers' Association (Ward 8), when Mr. Maplestone referred to the installation as "that costly toy." Mr. O'Callaghan pointed out that in January, 1892, the Committee borrowed £60,000 from the Prudential Assurance Company, and further sums of £8000, £15,400, £3850, and £600 from the London County Council; while Mr. G. A. Hodgkinson admitted that the Vestry's overdraft at the bank had increased from £2500 to £69,000 in four years! Mr. Matthews—evidently an optimist—maintained that, although the Stanhope Street installation had cost £90,000, and more money had been borrowed than a sound financial transaction would warrant, the heat obtained from the destruction of dust at the King's Road station would be sufficient to make the venture profitable. How this amazing conclusion was arrived at was not explained. The Committee cannot defer much longer the presentation of their 1894 accounts, and then some instructive facts will be revealed for the edification of the ratepayers, whose burden has been recently increased by another 3d. in the pound.

In pursuance of the powers conferred last session, the Corporation of Plymouth are making inquiries with a view to the adoption of electric lighting in the centre of the town. A Committee which was appointed last December has made a long report, mainly consisting of replies to a circular which they sent round to other corporate bodies. The effect of these replies is, they report, to clearly establish (1) that there is no instance on record in this country of an electric supply undertaking in the hands of a municipal corporation which has involved any charge upon the rates; (2) that the generation and supply of electricity are no longer in the experimental stage; and (3) that there is no reason why works should not be situate at a considerable distance from the centre of supply. Having regard to this, the Committee are "clearly and unanimously" of opinion that the Council should themselves exercise the powers they have obtained. They recommend that the generating station should be on the shores of the Cattewater, where the Corporation have recently acquired a large plot of land, and that in connection with it a refuse destructor should be erected. Before any final decision is come to, except as to the desirableness of the Corporation exercising the powers themselves, they recommend that a deputation should visit other works in various parts of the country.

**Messrs. R. Dempster and Sons, Limited,** have secured the order to add a third lift to a 70-feet telescopic gasholder for the Hurst Mills Company; the inner lift being allowed to leave the guide-framings They have likewise obtained the contract from the Longwood Gas Company for adding 32 feet to their 10 feet diameter scrubber.

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

The Council of the Incorporated Gas Institute sat for four hours yesterday, in the offices of the Gas Commission, making arrangements for the meeting of the Institute in Edinburgh in June. Though the Secretary felt it to be beyond his power to give me an account of what took place, I have learned that very satisfactory reports were given in. The technical part of the programme is not yet arranged, though, I understand, there is good promise of papers of importance being communicated. As far as regards the lighter portions of the week's business, these are all practically settled. The Edinburgh and Leith Gas Commissioners are to provide a reception and dance on the Tuesday night; on Wednesday there is to be a visit to the world-famous Forth Bridge; and on Friday, an excursion on a more than usually extended and interesting scale from Edinburgh to the Firth of Clyde and back, in which the visitors will have the pleasure of viewing the scenery in a district so wide as to include Arran, Loch Fyne, Rothesay, and Tarbet, upon Loch Lomond. The arrangements have been splendidly made for this event, which should prove one of the greatest attractions of the meeting. I may say, also, that the charges have been fixed on a scale of moderation which will not inconvenience anyone. The members of the North British Association of Gas Managers are to be invited to attend the meetings of the Institute. A proposal was, I believe, mooted as to the Association doing something in the way of entertaining the members of the Institute; but that has, for more reasons than one, been departed from. There has also, I understand, been a suggestion made of a dinner to be given to the members by the trade connected with the gas industry; but it cannot be admitted to the programme, and if given it must partake of a private nature. I heard that such a dinner had been resolved upon; but my information lacks confirmation, and I only give it for what it is worth. The Council are preparing a guide to Edinburgh and the neighbourhood, which will be given to members, and should prove useful, as similar publications have done in connection with the visits of other bodies to the city.

The inquiry by Sheriff Cheyne, of Renfrewshire, into the proposal of the Gourock Gas Commissioners to erect a gasholder in the midst of dwelling-houses, and the decision he gave authorizing the Commissioners to proceed with the erection without the consent of the residents in the neighbourhood, is of interest to nearly everybody owning gas-works. The interest arises chiefly in this way: Under section 5 of the Gas-Works Clauses Act, 1871, which is incorporated with every Special Act authorizing the erection of gas-works, it is necessary for the undertakers to obtain the consent in writing of every owner, lessee, and occupier of every dwelling-house within 300 yards of the limits of a site for a proposed gasholder. In section 18 of the Burghs Gas Supply (Scotland) Act, the same provision is made; but in 1893 this section was repealed, and power given to the Sheriff of a county, after inquiry, to dispense with the consent of any or all of the persons entitled to object. The Burghs Gas Supply Acts are in force in 16 places in Scotland, mostly small places which could not afford the cost of a Special Act; and therefore these 16 small places possess a privilege which is denied to all others, great or small. To all who are not under this amended Scotch Act, the prohibition is imperative, unless consent be obtained, which means that gasholders must either be planted at a distance from dwelling-houses, or consent be procured by purchase. The favour shown to these 16 small places in Scotland has either been obtained from Parliament unwittingly, or it is maintained unjustly against all other places in the United Kingdom, supplying gas under Special Acts. There must be many small places, besides those 16, working under Special Acts or Provisional Orders, which are in as great need of the removal of the restriction as those in Scotland were; or, on the other hand, the removal in the case of the Scotch burghs should not have been granted. Judging from the proceedings before Sheriff Cheyne, I should say that the removal of the restriction was a wise course for the Legislature to follow. In the case of Gourock, the opposition to the erection of the gasholder was most frivolous. The objectors, I suppose, knew that they might possibly convince the Sheriff that it was wrong to place a gasholder there; and they perhaps thought they might get compensation from the Commissioners for permission if they held out. Most people would do the same thing; and it is surely right that power should be given to some impartial person to say whether or not objections which may be taken are reasonable. Gourock is bounded by the sea on one side, and is hemmed in by hills on the other; so that sites for gas-works or gasholders, at a distance from dwelling-houses, are scarce. Besides, the owner of the land on which the town is built, and of the land adjoining the town, refused to give them a site on any land belonging to him; thereby compelling the Commissioners to negotiate with someone who had already acquired land from him. They found a person willing to sell a suitable plot of ground, which is enclosed on three sides by dwelling-houses, and on the fourth side is bounded by a street, the further side of which is built upon. It certainly is not desirable that a gasholder should be placed there. It is, however, a necessity, in the public interest, that one should be erected somewhere; and as this was the only suitable site which could be got, any objection to the holder must have been serious to have been effective. It is not enough that a gasholder may be an eyesore; many things are so besides gasholders, and yet are put down in residential districts. The fear of the depreciation of property is of no value; many things which are either put down in districts or are taken away do that, and nobody can object. Nuisance on account of smell was more plausible; but the strongest objection was the danger there would be of explosion. Both these points were, however, satisfactorily disposed of by the skilled evidence which was led on behalf of the Commissioners. There was no foundation for those objections. Probably it was because the expert evidence had disposed of the technical points that the Sheriff felt that the objection as to the effect upon rents, which was in a measure left to him to decide, was the most serious one. He was able to throw out that objection, however, on the ground that some of the objectors had, of their own will, gone to reside nearer to the gas-works than they would be to the new holder. The Commissioners thus won all along the line. It is curious to notice that, had they been an unincorporated company, of which there are many in Scotland, they might have proceeded with the erection of the holder without hindrance; subject only to claims for damages; had they been under a Special Act or a Provisional Order, they could not have done it at all; and that it is only open to 16 bodies of Police Commissioners in Scotland to call into use the simple and inexpensive procedure by which the Gas Commissioners of Gourock have been enabled to proceed with a necessary addition to their works. Should not an effort be made to procure an amendment of the Gas-Works Clauses Act of 1871, to the effect of extending the same privilege to the owners of all statutory gas undertakings? But even without an amendment, the views of Sheriff Cheyne may be of value to gas companies or corporations for negotiating for the consent of the owners or occupiers of property; because they show to what a narrow limit any claim they might make must be reduced.

There is a plethora of news from my quarter this week. I come now to the Informal Meeting of Gas Managers held in Glasgow last Wednesday, which I had the pleasure of attending on your behalf. The meeting was a very successful one. To me it was the most interesting of all meetings of gas managers which I have attended, not on account of its being a meeting confined almost to the subject of enrichment by oil gas, but because of its liveliness, and the strong division of opinion which was manifested. No "soft nothings" were talked; it was more a case of "hammer and tongs." The conflict of opinion was, so far as numbers were concerned, practically a one-sided one; the curious spectacle being presented of the Chairman occupying one side almost alone, and the meeting the other side. Perhaps, being an informal meeting, this was quite appropriate. Mr. Yuill, who filled the chair, had a difficult task in being obliged to answer almost every speaker; but who will say that he did not acquit himself well? Certainly no one can state that he manifested any feeling; he simply held to his opinions, and was always ready, in the most courteous manner, to give whatever explanations were necessary. Mr. Yuill, as is well known, is a strong believer in the Peebles oil-gas process; and although his address was by no means confined to this subject, it was almost the only one upon which there was any controversy. He was unfortunate, in more respects than one, in the support which he got. If Mr. M'Gilchrist's remarks be excepted—which I may do, as they only indirectly referred to the Peebles process—he only had the support of Mr. Terrace, of Brechin, and Mr. Waddell, of Broughty Ferry. Both of those gentlemen, however, have had less than a year's experience with the system, and so could not give much in the way of results; but, worse still, they both had to speak of difficulties in the working of the process. So far from there being anything at all blameworthy in their telling of the difficulties they had encountered, their frankness in acknowledging them was most commendable, as it showed the honesty with which the process is being promoted. It was a misfortune that, when there was so much able speaking on the other side, Mr. Yuill should have been left almost alone to support his views upon the Peebles process. It should be said, however, that he might, and most probably would, have received staunch support from Mr. A. Bell, of Dalkeith; but that gentleman was obliged to leave the meeting, on account of an attack of neuralgia. Mr. Smith, of Aberdeen, who paid a hurried visit to the meeting—coming in in the midst of the Chairman's address, and being obliged to leave almost as soon as he himself had spoken—was the cause, I am sure, innocently, of a misapprehension, in omitting to state that he was not speaking of the Peebles process. The discovery that he was not referring to it, merely gave a lift to the Peebles process by showing its superiority to the system by which he had worked. Mr. MacPherson's remarks were greatly thrown out of joint by Mr. Smith not being present to give the explanation which was furnished afterwards. It was left to Mr. M'Crae to drive home the views of the Chairman's critics. The questions asked will probably all be answered as the annual balance-sheets of the places where the oil process is being worked come out; and upon the results then shown will to a large extent depend the determination of the question of whether the Chairman or his critics leant most towards the true side of the subject. Mr. M'Gilchrist was responsible for the practical demolition of the rival scheme of oil-gas enrichment which was introduced into the Linlithgow Gas-Works; and although I have frequently asked how it was working, I could never get more than a shake of the head from anyone. Now it is known that in its present state it is not a practical competitor with the Peebles process. Mr. A. Wilson, of Dawsholm, when he spoke of oil processes, referred, I presume, to the water-gas process which he has been working. It was curious that he gave no figures as to the results—indeed, it has been all along subject of remark that, while the results obtained by the Peebles process have been as open as day to everyone who cared to inquire for them in any works where the process has been introduced, those secured in Glasgow have not been made known. Perhaps they may be at some of the meetings in the ensuing summer; and, if so, it will then be possible to make comparisons, which cannot be done at present. Mr. Wilson took occasion to disclaim the notion that water gas was responsible for the rather numerous fatalities from gas poisoning which occurred in Glasgow during the recent frost. The disclaimer was partly opinion and partly fact. The portion which was fact must be accepted—that deaths from gas poisoning took place in districts where water gas was not supplied. Regarding the part which was opinion, what he said was that "water gas had little or nothing to do with it." Perhaps the real event of the meeting was Mr. M'Gilchrist's desire to get out of the position of Convener. Well, I have been of opinion, and have so expressed myself for several years, that it is asking too much of one man, however willing to work—and we all know that Mr. M'Gilchrist is most energetic in everything he takes in hand—to go on always taking the trouble and the responsibility connected with the getting up of the "informal" meetings. I am not going to repeat my suggestions, because they are well known. I will merely say that there is a desire that these meetings, which have attactions peculiar to themselves, should be continued; and that everyone is pleased that Mr. M'Gilchrist has undertaken to pilot next year's meeting through.

I had the opportunity this week of seeing the new oil-gas plant which the Greenock Corporation have introduced into their works. Mr. Samuel Stewart, the Manager, your readers will be sorry to hear, is at

present unable to attend to his duties, having received a blast of dust from a retort into one of his eyes, and afterwards taken cold in it. He is, however, recovering. His Assistant (Mr. W. Mackie) kindly showed me over the works, which, if not particularly pleasantly, are very conveniently situated, having both railway and wharf accommodation. The works are comparatively new; and they are well arranged and tidy. The oil-gas plant, on the Peebles system, occupies one end of the west side of the retort-bench. There are 15 retorts; and the fittings are much the same as those in the Galashiels Gas-Works. The oil is conveyed into the works in railway tank-waggons, from which it is pumped into a circular storage tank capable of containing 12,000 gallons. From thence it is pumped, as required, into the small cistern on the top of the scrubber, and enters the manufacturing plant in the usual way. The gas, on leaving the scrubber, is measured by a special meter; and it is then conveyed past the coal-gas condensers, and is introduced into the coal-gas main before entering the purifiers. The whole plant is working satisfactorily.

The Edinburgh and Leith Gas Commissioners on Thursday let the contract for the ironwork of a new roof for a retort-house in the Edinburgh works to Messrs. Clayton, Son, and Co., Limited, of Leeds, at the sum of £2060 14s. There were 17 offerers.

The Perth Gas Commission, though there are still three weeks of the financial year to run, have exceeded the output of gas in any year hitherto; having reached 100 million cubic feet on Thursday. This is already 8½ million cubic feet more than was sent out of the works during the whole of the past year. The increase is attributed mainly to the larger number of gas stoves and cookers in use.

The Broughty Ferry Gas Commissioners have offered, in response to an application by the Police Commissioners of the newly-created burgh of Monifieth for a supply of gas, to lay a new 8-inch main to the boundary of the two burghs, from whence the Commissioners of Monifieth would require to lay their own piping. The price to be charged, it is reported, would, along with interest on the outlay, allow gas to be sold in Monifieth at a lower rate than it is in the neighbouring burgh of Carnoustie, where there is an independent gas-works, and where the charge is 5s. 5d. per 1000 cubic feet.

A short passage at arms took place in the Edinburgh Town Council yesterday, between the representatives of gas and electric lighting. The recommendation of the Electric Lighting Committee, that the attention of the Gas Commissioners should be called to the necessity for looking after faulty gas-pipes, was moved. In supporting the recommendation, Mr. Mackenzie assured the Council that there need be no apprehension of explosions in electric light conduits, as Professor Kennedy had informed him that there had been none in connection with the Westminster system of electric lighting, and the system in Edinburgh was on the same lines as that at Westminster. Bailie Kinloch Anderson looked upon the recommendation as a censure upon the Gas Commissioners, as it instructed them to do their duty. The Gas Commissioners, as a matter of fact, he added, were doing their utmost to repair the damage to their pipes which had been done in the laying down of the electric lighting system. The recommendation of the Committee was adopted.

It is reported that another disturbance took place on Monday of this week in the Lockerbie Gas-Works. A Commissioner, it is said, while on a visit to the works, felt himself insulted by one of the workmen, and, losing his temper, threw a piece of coal at a man, which cut him on the cheek.

One of the men who were sentenced to various terms of penal servitude for the attempt to blow up by dynamite one of the gasholders at the Tradeston Gas-Works in Glasgow twelve years ago, is said to have been released, and to have returned to the city.

## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April 6.*

**Sulphate of Ammonia.**—Business has been very slow this week; and the transactions have been only of limited extent. There are a few inquiries for delivery over the next few months; and buyers profess to have purchased at a discount even on present values, but this could only have been by speculators. It goes without saying that the demand does not at all come up to expectation; on the other hand, the shipments so far are on about a par with last year's. Sales at Liverpool have been at £10 10s.; and Leith is quoted at £10 7s. 6d. At Hull, the nominal price is £10 10s., but nothing doing. Regarding nitrate, with heavy arrivals of cargoes, the market has given way; and lower prices are now current at Continental ports. There appears to be some uncertainty whether any agreement will be come to to restrict the output. Consequently for distant arrivals, cargoes have been sold at 8s. On spot the price remains unchanged at 8s. 6d.

LONDON, *April 6.*

**Tar Products.**—A slightly better feeling obtains in this market; and, although there is no advance in price, business is undoubtedly brisker. Considerable sales of pitch are reported at prices varying from 32s. 6d. to 34s. 6d.; the variation representing prompt and forward delivery as well as port of shipment. Naphthalene and creosote salts are also in fair request. Creosote oil is somewhat languid; and makers are said to hold heavy stocks. Benzol and solvent naphtha are being shipped largely on contracts; but no new business of importance is mentioned. Carbolic acid, although now said to be outside the control of the Committee, is in good request, with the possibility of an improvement in value. Anthracene keeps steady. Values are as follows: Tar, 18s. to 21s. 6d. Pitch, 32s. 6d. to 34s. 6d. Benzol, 90's, 1s. 0½d.; 50's, 1s. Solvent naphtha, 1s. 0½d. Toluol, 1s. 2d. Crude, 30 per cent., naphtha, 4½d. Creosote liquid, 1½d.; ordinary, 1¼d.; salts, 20s. Cresylic acid, white, 1s. 1d.; brown, 10½d. Carbolic acid, 60's, 1s. 5½d. Anthracene, "A," 1s. 1d.; "B," 10d.

**Sulphate of Ammonia** does not improve in value as expected. On the contrary, there is a further decline in price. This is very remarkable, as the home demand is said to be better than usual. To-day's prices may be summarized as follows: Beckton terms, £10 7s. 6d.; London, £10 7s. 6d.; Hull, £10 10s.; Leith, £10 7s. 6d.; west country ports, £10 5s., all less 3½ per cent. Gas liquor is offered at 7s. to 8s. 6d.

## COAL TRADE REPORTS.

**From Our Own Correspondents.**

**Lancashire Coal Trade.**—Generally a steady quietening down is reported as regards the demand for most qualities of fuel, with some descriptions becoming rather a drug upon the market. List rates are without quotable change; but collieries in some instances would give way to secure orders, and the tendency of prices is generally towards easing down. Pits as a rule are only working about four days per week; and even with this restricted output, here and there a small quantity is going into stock. In round coals the better qualities are meeting with but a slow demand for domestic purposes; the advent of spring necessarily tending to restrict requirements for house coal. Pit quotations remain at about 10s. 6d. to 11s. per ton for best Wigan Arley; 8s. 6d. to 9s. 6d., for Pemberton four-feet and seconds qualities of Arley; and 7s. 6d. to 8s., for common house-coals. The inferior qualities of round coal are becoming very difficult to move away; the demand for iron making, steam, and general manufacturing requirements showing no appreciable improvement. Extremely low prices are ruling, especially for quantities; ordinary steam and forge coals not averaging more than 6s. to 6s. 6d. per ton at the pit mouth. There are also ample supplies of engine fuel on the market; but a tolerable demand comes forward, and in most instances collieries are disposing of their present restricted production fairly well. Prices are without alteration, late rates being generally well maintained. The average is from 3s. 6d. to 4s. per ton for common sorts, and 4s. 6d. to 5s. for better qualities, at the pit mouth. The business doing in the shipping trade continues only very limited in weight; and low prices are taken to get hold of orders. The better qualities of steam coal average about 8s. to 8s. 3d. per ton delivered at the High Level, Liverpool, or the Garston Docks; but some of the lower descriptions could be bought at about 7s. 6d. per ton delivered.

**Northern Coal Trade.**—The demand for coal is a little improved as far as steam qualities are concerned; but it is falling off both for gas and household coal. Best Northumberland steam coal is, however, quieter, because the settlement of the Welsh coal dispute has made consumers less doubtful about the future, and their purchases are more to cover immediate requirements. The price is about 8s. 6d. to 8s. 9d. per ton f.o.b.; whilst the demand has increased for steam smalls, for which the price has risen to 4s. per ton. In gas coals, there are now negotiations in progress for some of the largest contracts that are given out. It is believed that these contracts have had much to do with what seems likely to be at least the great change in the Durham Coal Sales Association that is impending. As far as is known, the price that seems likely to rule will be from 6s. 6d. to 6s. 9d. per ton f.o.b.; but as deliveries under the new contracts do not commence until after the end of the half year, it is possible that they may be only slowly settled, and that the fluctuations of the market price may affect the contracts. At present, the price quoted by the combination firms varies from 6s. 9d. to 7s. 3d. per ton f.o.b. As to manufacturing coals, there is a rather better demand; but the supply is ample, and the price is not affected. Coke is a little steadier; the consumption having increased, whilst the exports are about an average. Prices are from 12s. 6d. to 13s. 6d. per ton f.o.b. There is no alteration in the price of gas coke; but with a good shipment and a lessened output stocks are kept low.

**Scotch Coal Trade.**—There is no improvement, either in demand or prices. The coalmasters on Friday resolved, after much consideration, to reduce the miners' wages by 6d. per day, which may have some effect on prices. The men seem disposed to submit. The rates quoted are: Main, 6s. per ton f.o.b. Glasgow; ell, 7s. to 7s. 3d.; splint, 6s. 6d. to 6s. 9d.; and steam, 7s. 6d. The shipments for the week amounted to 123,095 tons—a decrease on the preceding week of 39 tons, and as compared with the corresponding week of last year of 26,988 tons. For the year to date, the total shipments have been 1,331,139 tons—a decrease as compared with the corresponding period of last year of 363,273 tons.

**The Automatic Coal-Gas Retort Company and the Newcastle-under-Lyme Corporation.**—It was reported at last Tuesday's meeting of the Newcastle-under-Lyme Town Council that the Automatic Coal Gas Retort Company, Limited, had commenced an action against the Corporation to recover £345 12s., the amount of alleged royalties on beds of inclined retorts, and had served upon the Town Clerk the writ in the action; that an appearance had been entered to such writ, and statement of claim required; that the Company had taken out a summons for summary judgment; and that the Town Clerk had caused an affidavit by Mr. Winstanley to be filed thereto.

**Blackpool Corporation Gas Supply.**—The gas undertaking of the Blackpool Corporation progressed very satisfactorily, under the supervision of Mr. John Chew, the Gas Engineer, in the year which closed on the 25th ult. The quantity of gas made was 255,150,000 cubic feet, as compared with 245,400,000 cubic feet in the preceding twelve months; being an increase of 9,750,000 cubic feet. Notwithstanding this, 503 tons less coal was carbonized; the figures being 26,097 tons in the past year, and 26,660 tons in 1893-4. There was an increase of 590 in the number of consumers. With regard to the public lighting, 87 gas-lamps were superseded by the electric light; but 110 new ones were put up, so that there was a gain of 23.

**The Ilfracombe District Council and the Gas Company's Bill.**—Some discussion with reference to the recent proceedings in connection with the promotion of the Ilfracombe Gas Company's Bill in the House of Lords took place at a meeting of the District Council last Tuesday. The rejection of the Bill by the Lords' Committee having been formally reported, Mr. Braund said it ought to go forth that that Committee paid very little, if any, attention to the suggestion that the Council should buy the gas-works. Mr. Vickery asked if the representatives of the Council had not given a guarantee that the works would be purchased by the town. The Chairman (Mr. T. Copp) said they were told that if they would give a promise to purchase the works the Bill would be rejected at once. They replied that they could only make a promise subject to the approval of the ratepayers; and they gave that promise. The representatives of the Council were thanked for their action in connection with the Bill.

**The Borrowing Powers of Stockton for Water-Works Purposes.**—A Local Government Board inquiry was held at Stockton last Thursday week in regard to an application by the Corporation for sanction to borrow £14,500 in connection with the water-works. The money is required to meet the share of Stockton in expenditure for the extension of the mains of the Stockton and Middlesbrough Water Board. The total amount of the precepts has been £21,135 13s. 8d. Previous permission had been given to borrow £13,000; so that the borrowing powers have been exceeded by £8135. The sum now applied for would recoup the £8135 named, and leave a balance for future expenditure of £6365.

**Dartmouth Gas Company.**—The 37th annual meeting of the Dartmouth Gas Company was held yesterday week—Mr. J. Bartlett, the Chairman, presiding. The balance-sheet showed that, after the payment of the usual dividend of 10 per cent., a balance of £454 remained to be carried forward. The Chairman said there was a slight increase in the receipts for gas, which the Board attributed to the fact that an exhibition of gas cooking and heating appliances was held during the year. The balance-sheet was adopted, and a dividend declared. The Manager (Mr. J. Tall) and the Secretary (Mr. R. Cranford) were thanked for their services. In reply, the Manager suggested a trial of the system of fitting up small houses for gas, and charging an extra price to pay for the outlay.

**Monte Video Water Company.**—The Directors of this Company, in their report for the past year, state that the gross revenue amounted to £75,921; being a decrease of £1597 as compared with the previous year. The net income amounts to £46,788, as compared with £48,068 in 1893. After providing for interest and other charges, and setting aside £2000 as provision for possible loss on outstanding accounts, there remains an available balance of £22,958 at the credit of the profit and loss account. Out of this an interim dividend of 2½ per cent. was paid on Nov. 1 last; and the Directors now recommend a further dividend of 2½ per cent., making 5 per cent. for the year, free of income-tax, carrying forward the balance of £2958. The services in operation show an increase on the year 1893, and now number 10,338.

**Exhibitions of Gas Appliances.**—Messrs. Richmond and Co., Limited, opened last week a gas and local trades exhibition at the Princes Hall, Kew Bridge. It has been well attended—the lantern lectures and musical intervals being greatly appreciated—and it is to be continued till to-morrow. They also exhibited at Portsmouth for a fortnight, from the 12th to the 22nd ult.; the result being a considerable influx of orders for cookers. The Incandescent Gas-Light Company's stand, covering nearly 400 square feet was much admired. The gas exhibition promoted by the Derby Gas Company, in conjunction with Messrs. Richmond and Co., Limited, the Davis Gas-Stove Company, Limited, and a number of other exhibitors, has proved a great success—being visited by upwards of 25,000 people; and it would have been extended had not the hall been required for a bazaar.

**A Leaky Reservoir.**—The subject of the leakage at the Millbrook reservoir was again under consideration at the meeting of the St. German's District Council last Thursday. Mr. Masterton, the Engineer for the works, was present, and said that observations showed that the water had fallen 5 inches in the previous fortnight. The leakage was still going on; but he could not say where it took place. The best way would be to gradually empty the reservoir and have a thorough inspection. He could not give any estimate of the cost of making the reservoir water-tight. A question was asked as to who would have to pay for the work. The Chairman (Mr. R. J. Paige) said it would fall upon the ratepayers. It had not been suggested that the leakage was due to bad workmanship. Mr. Masterton remarked that the work had not yet been taken over from the contractor. It was decided to carry out the suggestion to empty the reservoir.

**The Bradford Corporation Gas Committee and the Oil-Gas Experiments.**—A meeting of the Gas and Electricity Supply Committee of the Bradford Corporation was held last Thursday, for the purpose of considering the oil-gas experiments which have for some time past been conducted at the works by Dr. Dvorkovitz. Reports of a conflicting character dealing with the success or otherwise of the experiments were laid before the Committee, including reports from the Gas Engineer (Mr. W. Wood) and statements by Dr. Dvorkovitz—the latter gentleman appearing before the meeting. In the course of a personal statement on the matter, he urged that, in some of the later experiments, he had been placed at great disadvantage in consequence of the exceptionally severe weather. Some of the Committee were disposed to act upon the advice conveyed in a letter which a member had received from a scientific man in London in reply to an inquiry in regard to the matter. But it was pointed out to be inexpedient to take any definite step, except upon the authority of a responsible report from an expert; and the matter was eventually left over till a future meeting, nothing being decided.

**The Birmingham Water Department and the Late Frost.**—A great deal of dissatisfaction has been felt in Birmingham (says a local contemporary) at the slow progress that has been made in repairing the injury to the distributing plant of the Water Department by the recent severe frost. A great many people are still without water other than that furnished to them by water-carts. The dissatisfaction will not be diminished by the fact that the cost of repairing and relaying mains, remaking roads, and the provision of a temporary supply will probably amount to £15,000, or it may be even more. This sum if levied as a rate would be equal to an extra 2d. in the pound over and above the increase of rates—amounting to 3d. or 4d.—in connection with the ordinary work of the Corporation. At the meeting of the Water Committee last Friday, an interim report was presented as to the effect of the frost, more particularly with regard to burst pipes. The document showed that there had been burst pipes in 176 roads. Of these, 162 have been completely repaired, and the full supply restored. The remaining 14 are still under repair. The mere statement of the number of roads, it was pointed out, did not represent the extent of the difficulties of the department, as in some cases they had had roads under repair for a fortnight or three weeks. The number of new pipes laid in repairing the bursts had been 1675; and this may be taken as representing the number of individual breakages.

**Cookery Lectures at Ealing and Twickenham.**—Miss W. Cameron, whose sister is so well-known as the cookery expert of The Gaslight and Coke Company, has just completed her first two series of cookery lectures on behalf of Messrs. C. Wilson and Sons, of Leeds and London, under the auspices of the Brentford Gas Company. They were delivered at Victoria Hall, Ealing, and the Town Hall, Twickenham, respectively. In the hands of this lady, the stove tells its own story; leaving to the salesman a very easy task to complete the business.

**City of St. Petersburg New Water-Works Company, Limited.**—At an extraordinary meeting of this Company on the 26th ult.—Mr. W. T. Western presiding—the resolutions that were passed at the previous meeting (*ante*, p. 553) were confirmed. They were to the effect that the capital should be reduced from £200,000 to £130,000, by cancelling capital which was unrepresented by available assets to the extent of £7 per share upon the 10,000 shares which had been issued; and that the Articles of Association should be altered so as to give the Directors power to pay dividends half yearly out of any periodical payments received from the Municipality of St. Petersburg.

**Bridlington District Council and the Water Company's Bill.**—At a meeting of the Bridlington District Council last Tuesday week, the Water Bill Committee reported that an arrangement had been arrived at with the Water Company, on the following terms: The Bill to contain clauses relative to the supply of water free in case of fire, and at certain charges for watering the streets; also a purchase clause, giving the Council the right to acquire the undertaking by arbitration under the Lands Clauses Act, on giving six months' notice. If such rights be exercised within five years from the passing of the Act, the costs of obtaining the Act are to be added to the price; and, in estimating the value, the sale is to be considered a compulsory one, but the Company should not be entitled to any other enhanced value through having obtained the Act. If after the five years above named, the right to purchase be exercised, the costs of obtaining the Act should not be reckoned, but the ordinary price shall be given which would be paid for any similar undertaking having an Act of Parliament. Clauses empowering the Council to borrow money for purchasing the undertaking, and for paying the costs of obtaining such powers, are also inserted in the Bill.

## GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 743.)

| Issue. | Share | When ex-Dividend. | Dividend or Div. & Bonus. | NAME. | Pa'd per Share | Closing Prices. | Rise or Fall in Wk. | Yield upon Invest-ment. |
|---|---|---|---|---|---|---|---|---|
| £ | | | p.c. | GAS COMPANIES. | | | | £ s. d. |
| 590,000 | 10 | 11 Oct. | 10½ | Alliance & Dublin 10 p. c. | 10 | 21½–22½ | .. | 4 13 4 |
| 100,000 | 10 | ,, | 7½ | Do. 7 p. c. | 10 | 14½–15½ | .. | 4 16 9 |
| 300,000 | 100 | 2 Jan. | 5 | Australian (Sydney) 5 % Deb. | 100 | 105–107 | .. | 4 13 4 |
| 200,000 | 5 | 14 Nov. | 6½ | Bombay, Limited | 5 | 6¼–6¾ | .. | 4 16 5 |
| 40,000 | 5 | ,, | 6½ | Do. New | 4 | 4¾–5 | .. | 5 4 0 |
| 380,000 | Stck. | 28 Feb. | 11½ | Brentford Consolidated | 100 | 243–248 | .. | 4 12 8 |
| 180,000 | ,, | ,, | 8½ | Do. New | 100 | 195–200 | .. | 4 5 0 |
| 220,000 | Stck. | 14 Mar. | 11 | Brighton & Hove Original | 100 | 220–225 | .. | 4 17 9 |
| 888,500 | Stck. | 28 Feb. | 5 | Bristol | 100 | 118–121 | .. | 4 2 8 |
| 320,000 | 20 | 28 Mar. | 11½ | British | 20 | 50–51* | .. | 4 8 2 |
| 50,000 | 10 | 14 Mar. | 11½ | Bromley, Ordinary 10 p. c. | 10 | 21–22 | .. | 5 4 7 |
| 51,510 | 10 | ,, | 8½ | Do. 7 p. c. | 10 | 16–17 | .. | 5 0 0 |
| 328,750 | 10 | 14 Nov. | 2 | Buenos Ayres (New) Limited | 10 | 6¼–6¾ | .. | 2 19 3 |
| 200,000 | 100 | 2 Jan. | 6 | Do. 6 p. c. Deb. | 100 | 100–103 | .. | 5 16 7 |
| 150,000 | 20 | 28 Feb. | 8½ | Cagliari, Limited | 20 | 26½–27½ | .. | 6 0 0 |
| 550,000 | Stck. | 11 Oct. | 13¾ | Commercial, Old Stock | 100 | 287–292 | .. | 4 12 5 |
| 165,000 | ,, | ,, | 10¾ | Do. New do. | 100 | 215–220 | .. | 4 15 5 |
| 160,762 | ,, | 13 Dec. | 4½ | Do. 4½ p. c. Deb. do. | 100 | 130–135 | .. | 3 6 8 |
| 800,000 | Stck. | 13 Dec. | 13 | Continental Union, Limited. | 100 | 247–252 | .. | 5 3 2 |
| 200,000 | ,, | ,, | 10 | Do. 7 p. c. Pref. | 100 | 205–210 | .. | 4 15 3 |
| 535,800 | Stck. | 28 Feb. | 5½ | Crystal Palace Ord. 5 p. c. Stk | 100 | 118–123 | .. | 4 5 4 |
| 486,090 | 10 | 31 Jan. | 11 | European, Limited | 10 | 24–25 | .. | 4 8 0 |
| 351,060 | 10 | ,, | 11 | Do. Partly paid | 7½ | 17–18 | .. | 4 11 9 |
| 5,646,590 | Stck. | 14 Feb. | 12 | Gaslight & Coke, A, Ordinary | 100 | 267–272 | .. | 4 8 3 |
| 100,000 | ,, | ,, | 4 | Do. B, 4 p. c. max. | 100 | 105–110 | .. | 3 12 9 |
| 665,000 | ,, | ,, | 10 | Do. C, D, & E, 10 p.c.Pf. | 100 | 275–280 | .. | 3 11 5 |
| 30,000 | ,, | ,, | 5 | Do. F, 5 p. c. Prf. | 100 | 130–135 | .. | 3 14 1 |
| 60,000 | ,, | ,, | 7½ | Do. G, 7½ p. c. do. | 100 | 197–202 | .. | 3 14 3 |
| 1,300,000 | ,, | ,, | 7 | Do. H, 7 p. c. max. | 100 | 183–188 | .. | 3 14 6 |
| 463,000 | ,, | ,, | 10 | Do. J, 10 p. c. Prf. | 100 | 275–280 | .. | 3 11 5 |
| 476,000 | ,, | ,, | 6 | Do. K, 6 p. c. Prf. | 100 | 163–168 | .. | 3 11 5 |
| 1,061,150 | ,, | 13 Dec. | 4 | Do. 4 p. c. Deb. Stk. | 100 | 128–131 | .. | 3 1 0 |
| 294,850 | ,, | ,, | 4½ | Do. 4½ p. c. do. | 100 | 140–145 | .. | 3 2 1 |
| 908,000 | ,, | ,, | 6 | Do. 6 p. c. do. | 100 | 188–192 | .. | 3 2 6 |
| 3,800,000 | Stck. | 14 Nov. | 12 | Imperial Continental | 100 | 242–246 | +1½ | 4 17 7 |
| 75,000 | 5 | 13 Dec. | 6 | Malta & Mediterranean, Ltd. | 5 | 5¾–6¼ | .. | 4 16 0 |
| 563,000 | 100 | 1 Apl. | 5 | Met.of Melbourne, 5 p.c. Deb. | 100 | 109–111* | +½ | 4 10 1 |
| 541,920 | 20 | 14 Nov. | 5 | Monte Video, Limited | 20 | 15⅝–16⅜ | .. | 6 1 2 |
| 150,000 | 5 | 29 Nov. | 8 | Oriental, Limited | 5 | 7–7½ | .. | 5 6 8 |
| 60,000 | 5 | 28 Mar. | 7 | Ottoman, Limited | 5 | 4½–5* | .. | 7 0 0 |
| 166,870 | 10 | 14 Feb. | 2 | Para, Limited | 10 | 1½–2½ | .. | 8 0 0 |
| | | | | People's Gas of Chicago— | | | | |
| 420,000 | 100 | 2 Nov. | 6 | 1st Mtg. Bds. | 100 | 105–109 | .. | 5 10 1 |
| 500,000 | 100 | 1 Dec. | 6 | 2nd Do. | 100 | 102–107 | .. | 5 12 1 |
| 150,000 | 10 | 11 Oct. | 7† | San Paulo, Limited | 10 | 8¾–9¼ | .. | 7 7 4 |
| 500,000 | Stck. | 14 Feb. | 15½ | South Metropolitan, A Stock | 100 | 350–360 | .. | 4 6 1 |
| 1,350,000 | ,, | ,, | 12 | Do. B do. | 100 | 290–300 | .. | 4 0 0 |
| 290,000 | ,, | ,, | 13 | Do. C do. | 100 | 305–310 | +5 | 4 3 10 |
| 775,000 | ,, | 16 Jan. | 5 | Do. 5 p. c. Deb. Stk. | 100 | 167–172 | .. | 2 18 2 |
| 60,000 | Stck. | 28 Feb. | 11½ | Tottenham & Edm'nton, "A" | 100 | 230–235 | .. | 4 17 10 |
| | | | | WATER COMPANIES. | | | | |
| 746,021 | Stck. | 28 Dec. | 10½ | Chelsea, Ordinary | 100 | 278–283 | .. | 3 11 6 |
| 1,719,514 | Stck. | 11 Oct. | 8 | East London, Ordinary | 100 | 220–225 | .. | 3 11 1 |
| 654,740 | ,, | 28 Dec. | 4½ | Do. 4½ p. c. Deb. Stk. | 100 | 147–152 | .. | 2 19 2 |
| 700,000 | 50 | 13 Dec. | 8½ | Grand Junction | 50 | 109–113 | –1 | 3 15 3 |
| 708,000 | Stck. | 14 Feb. | 12 | Kent | 100 | 300–305 | .. | 3 18 8 |
| 1,043,800 | 100 | 28 Dec. | 9½ | Lambeth, 10 p. c. max. | 100 | 245–250 | –1 | 3 16 0 |
| 406,200 | 100 | ,, | 7½ | Do. 7½ p. c. max. | 100 | 198–203 | –2 | 3 13 10 |
| 330,000 | Stck. | 28 Mar. | 4 | Do. 4 p. c. Deb. Stk. | 100 | 132–136* | .. | 2 18 10 |
| 500,000 | 100 | 14 Feb. | 12½ | New River, New Shares | 100 | 370–380 | .. | 3 7 0 |
| 1,000,000 | Stck. | 31 Jan. | 4 | Do. 4 p. c. Deb. Stk. | 100 | 140–143 | .. | 2 15 11 |
| 902,300 | Stck. | 13 Dec. | 6 | S'thwk & V'xhall, 10 p.c. max. | 100 | 148–153 | +1 | 3 18 5 |
| 126,500 | 100 | ,, | 6 | Do. D 7½ p.c. do. | 100 | 140–145 | .. | 4 2 9 |
| 1,155,066 | Stck. | 13 Dec. | 10 | West Middlesex | 100 | 268–273 | +1 | 3 13 3 |

*Ex div.

† Next dividend will be at this rate.

# GWYNNE & BEALE'S
## PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

# GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

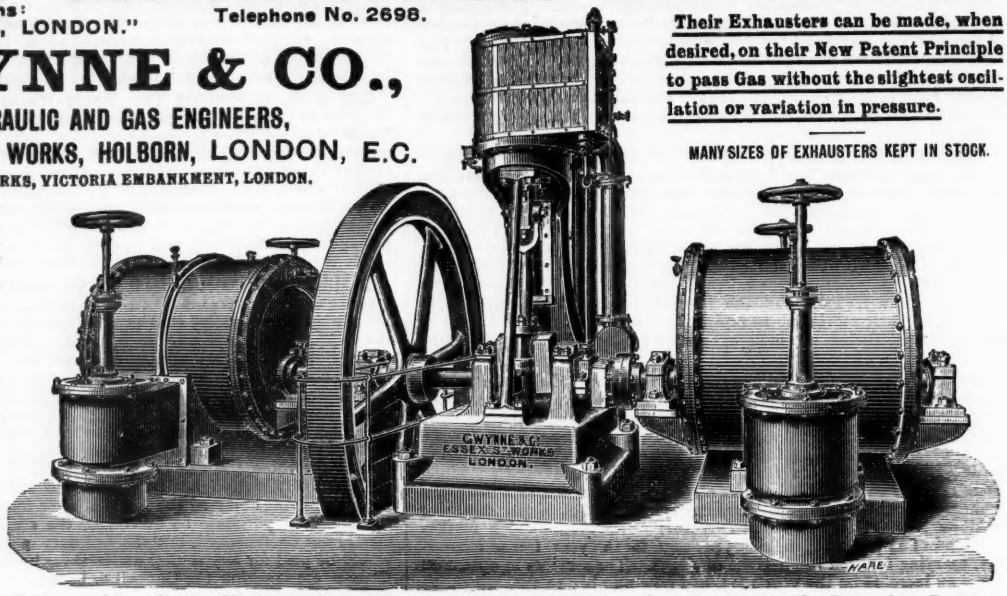
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

**Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.**




**Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.**

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.


## EASTER HOLIDAYS.

NOTICE TO ADVERTISERS.—In consequence of the EASTER HOLIDAYS, orders with respect to ADVERTISEMENTS should be received at the Office *not later* than THE FIRST POST ON SATURDAY NEXT.


GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

**O'NEILL'S Oxide has a larger annual** sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

JOHN WM. O'NEILL, Managing Director,
Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to be addressed to Palmerston Buildings.

**WINKELMANN'S "VOLCANIC"** CEMENT. Fire Resistance up to 4500° Fahr In use in most Continental Gas-Works, and in more than 300 British Gas-Works.

ANDREW STEPHENSON,
182, GRESHAM HOUSE,
OLD BROAD STREET,
LONDON, E.C.

*Telegrams: "Volcanism, London."*

**AMMONIACAL LIQUOR Wanted.**
BROTHERTON AND Co., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

**GAS TAR Wanted.**
BROTHERTON AND Co., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

**SPENT OXIDE Wanted.**
BROTHERTON AND Co., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

**BROTHERTON & CO.**
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

GOLD MEDAL, 1892.

**TUBES and Fittings for Gas, Steam, and** Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

CHARTERING, FORWARDING, AND INSURANCE.

**ROBERT BRUCE FITZMAURICE, 29,** Great St. Helens, London, Shipping Agent to several Gas Companies and Plant Manufacturers, would be glad to UNDERTAKE LARGE or SMALL SHIPMENTS to any Port.

**PORTER & CO., Gowts Bridge Works,** LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for, Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."

**W. C. HOLMES & CO., Huddersfield;** AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also Improved Patent Rotary Scrubber-Washers.
*** See Advertisement p. II., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

**J. & J. BRADDOCK, Globe Meter Works,** Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

**JOHN NICHOLSON & SONS, Limited,** Chemical Works, Leeds, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

SPECIAL PAINT FOR GAS-WORKS.

**JOHN E. WILLIAMS AND CO.,**
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

GAS PLANT CEMENT.

**JOHN E. WILLIAMS AND CO.,**
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

AMMONIA SATURATORS.

**WALTER THOMASON and SONS,** Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

PATENTS FOR INVENTIONS.

**J. C. CHAPMAN, M.I.M.E. and Fel.** Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

**SADLER AND CO., LIMITED,** MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

**BALE & CO.'S Oxide of uniform quality** Sample and Price on application.
OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

**FINEST Quality of Natural Bog Ore.** Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

*In Paper Covers, Post Free, Price 2s.*

**S. CARPENTER on the Purification of** COAL GAS from CARBONIC ACID and the SULPHUR COMPOUNDS by LIME, OXIDE OF IRON, and ATMOSPHERIC AIR.
S. & H. W. CARPENTER, 3, Bedford Villas, Carshalton, SURREY.

HYDRAULIC MAINS.

**ACCUMULATION of thick Tar entirely** prevented. A great reduction in Stopped Ascension-Pipes by using CARPENTER'S PATENT HYDRAULIC MAIN CLEANER. No expense beyond first cost.
All Particulars on application to S. & H.W. CARPENTER, Vulcan Iron-Works, Rhodeswell Road, Limehouse, LONDON, E.

**HUTCHINSON BROTHERS,** Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See last week, p. 725.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

HYDRATED OXIDE OF IRON.

**PREPARED from pure Iron.**
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

**YOUNG Man (age 30) requires a Situa-** tion as MAIN and SERVICE LAYER. Can fix Meters and Stoves if required. Many years' experience. Has excellent References, and good reasons for change.
Address No. 2507, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**ADVERTISER, having long experience** in CONSTRUCTION AND VALUES OF GAS APPARATUS, &c., would be glad to arrange with Firm desiring to enter this Branch of Engineering. Would take Commercial charge throughout, if desirable.
Apply by letter, in first instance, to No. 2505, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**WANTED, a young Gentleman to** assist in the Laboratory and Drawing Office.
Applications, with *copies* of recent Testimonials, to R. O. PATERSON, Gas-Works, CHELTENHAM.

CLEETHORPES GAS COMPANY.

**WANTED, a good Gas-Fitter, with** practical knowledge of Dry-Meter Repairing.
Apply to E. J. BROCKWAY, Engineer, &c.

**STOKER wanted, by a small Gas Com-**pany near London. Must be used to Boiler and Engine, and have a good character. Good Wages.
Apply, by letter, to No. 2506, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

**CLERK wanted in a small Gas-Works** in the South of England. One with some knowledge of Drawing preferred.
Apply, by letter, stating Age, Qualifications, and Salary required, to No. 2508, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF PORTSMOUTH WATER-WORKS COMPANY.

**WANTED, an experienced Plumber as** a WASTE-WATER INSPECTOR. One who has been accustomed to Deacon's Waste Water System, and who holds a Certificate from the Worshipful Company of Plumbers preferred.
Wages, £2 per week.
Candidates (not to be over 35 years of age) to make application to the Secretary at the Company's Offices, Commercial Road, Portsmouth, on or before Monday, the 15th of April next.

By order,
R. W. FORD,
Secretary.

Offices: Commercial Road, Portsmouth.

BOROUGH OF DARWEN.

APPOINTMENT OF GAS MANAGER.

**THE Darwen Corporation are prepared** to receive APPLICATIONS for the appointment of ENGINEER and MANAGER to their Gas-Works.
The person appointed must be a qualified Gas Engineer; and he will be required to devote the whole of his time to the discharge of the duties of the Office.
The Salary will be £260 per annum; the Corporation providing offices and the necessary staff.
Applications, stating Age, Experience, and accompanied by not more than three recent Testimonials, must be sent or delivered, addressed to me, the undersigned, marked "Gas Manager," at my Office not later than Ten o'clock a.m. on Wednesday, the 17th of April.

By order,
CHAS. COSTEKER,
Town Clerk.

Town Clerk's Office, Darwen,
April 2, 1895.

**FOR SALE—Two second-hand Purifiers.**
Size, 10 ft. by 5 ft. by 3 ft. deep, inside measurements, with Covers and Wood Grids, by Dempster, of Elland, complete.
For further Particulars, apply to the SECRETARY, Gas-Works, BRECON.

TOWN AND COUNTY OF POOLE GAS AND COKE COMPANY, LIMITED.

**THE Directors of the above Company** invite TENDERS for the supply of best GAS COAL f.o.b. in the Tyne or Wear, for One or Two Years, from the 1st day of June next.
The quantity required will be about 3000 tons per year.
Sealed tenders, endorsed "Coal," to be sent to the undersigned by Monday, the 6th day of May next.

By order,
WILLIAM DAVIS,
Manager.

Gas-Works, Poole,
April 4, 1895.

COUNTY BOROUGH OF BURY.

**THE Gas Committee of the Corporation** of Bury are open to receive TENDERS for the supply of 250 tons of OXIDE OF IRON for Gas Purification, to be delivered free, at the Gas Siding, Bury.
Full Particulars and Form of Tender may be had on application to Mr. W. H. S. Gendall, Engineer and Manager, Gas-Works, Bury.
Sealed tenders, endorsed "Tender for Oxide of Iron," to be sent to me, the undersigned, on or before Monday, April 24, 1895.
Preference will be given to those persons or firms who pay to their workpeople the regular standard rate of wages obtaining at the time in the town or district.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bury,
April 6, 1895.

COUNTY BOROUGH OF BURY.

TO SULPHURIC ACID MAKERS.

**THE Gas Committee of the Bury Cor-**poration are prepared to receive TENDERS for the supply of about 300 tons of SULPHURIC ACID for the Manufacture of Sulphate of Ammonia for a period of One Year from the 1st of May, 1895.
Forms of Tender and Conditions may be obtained on application to Mr. W. H. S. Gendall, Engineer and Manager, Gas-Works, Elton, Bury.
Sealed tenders, endorsed "Tender for Acid," to be sent to me, the undersigned, on or before Monday, April 22, 1895.
Preference will be given to those persons or firms who pay to their workpeople the regular standard rate of wages obtaining at the time in the town or district.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bury,
April 6, 1895.

NEWPORT (ISLE OF WIGHT) GAS COMPANY.

**TENDERS are invited for the supply of** about 60 Tons of CAST-IRON SPIGOT and SOCKET PIPES and SPECIAL CASTINGS, to be delivered into Barge at Southampton or Cowes.
Particulars may be obtained of the Engineer, Mr. F. G. Cockey.
Tenders to be delivered not later than the 20th inst., to the CHAIRMAN, Newport Gas Company, 98, High Street, Newport, ISLE OF WIGHT.

TENDERS FOR PIPES.

**THE Directors of the Tynemouth Gas** Company are prepared to receive TENDERS for the supply of about 85 Tons of 14-inch CAST IRON PIPES, and about 3 tons of SPECIALS.
Particulars on application.
Tenders to be forwarded to the undersigned on or before Wednesday, the 17th inst.

W. HARDIE, jun.,
Engineer.

Gas-Works, North Shields,
April 6, 1895.

LLANDUDNO URBAN DISTRICT COUNCIL.

OXIDE OF IRON.

**THE Council invite Tenders for the** supply of 110 Tons of OXIDE OF IRON for Purification purposes, delivered at Llandudno Station.
Tenders, endorsed "Oxide," to be delivered to me not later than April 16.
The lowest or any tender not necessarily accepted.

A. CONOLLY,
Clerk to the Council.

Council Offices, Llandudno,
April 6, 1895.

BOROUGH OF CHORLEY.

**THE Chorley Corporation are prepared** to receive TENDERS for the supply of FIRE-CLAY RETORTS, FIRE-BRICKS, &c., according to Particulars which may be obtained on application to Mr. R. Fearnley, Gas Manager, Chorley.
Tenders, endorsed "Retorts," to be sent to me on or before Tuesday, the 16th inst.

By order,
JNO. MILLS,
Town Clerk.

April 3, 1895.

**THE Ballymena and Harryville Gaslight** Company, Limited, invite TENDERS for 1700 tons of best Screened GAS COAL, free on Waggon at Larne Harbour, to be delivered before the 1st of November next.
Payment to be made on the first Thursday in March, 1896.
Tenders to be lodged with me on or before Friday, the 12th of April.

THOMAS C. C. HOOD,
Secretary.

Ballymena, April 2, 1895.

BOROUGH OF HEYWOOD.

**THE Gas Committee invite Tenders** for the supply of 10,000 tons of COAL.
Specification and Form of Tender may be obtained on application to Mr. Whatmough, Gas Manager.
Contractors tendering must pay their workpeople at least the standard or trade union rate of wages, and observe the trade conditions which attach to the various kinds of work for which the tender is sent in.
Sealed tenders, endorsed "Coal," to be sent to me not later than Tuesday, April 16, 1895.

By order,
A. B. PILLING,
Town Clerk.

Municipal Buildings, Heywood,
March 30, 1895.

BOROUGH OF HEYWOOD.

**THE Gas Committee invite Tenders for** the supply of about 1000 yards of 4-inch CAST-IRON PIPES and SPECIALS.
Specification and Form of Tender may be obtained on application to Mr. Whatmough, Gas Manager.
Contractors tendering must pay their workpeople at least the standard or trade union rate of wages, and observe the trade conditions which attach to the various kinds of work for which the tender is sent in.
Sealed tenders, endorsed "Iron Pipes," to be sent to me not later than Tuesday, April 16, 1895.

By order,
A. B. PILLING,
Town Clerk.

Municipal Buildings, Heywood,
March 30, 1895.

COUNTY BOROUGH OF WIGAN.

**THE Gas and Electric Lighting Com-**mittee invite TENDERS as follows:—
CONTRACT No. 1.—Cast Mains and Connections.
" 2.—Wrought-Iron Tube and Fittings.
" 3.—Brass Tube and Fittings.
" 4.—Lead Pipe.
" 5.—Firing and Charging Shovels.
" 6.—Brooms.
" 7.—Wood Troughing and Covering.
" 8.—Galvanized Stove Pipe and Connections.
" 9.—Bar Iron.
The contracts will be for One Year, commencing on the 1st of April next ensuing, and ending on the 31st of March, 1896.
Forms of Tender to be obtained from the undersigned.
The Committee do not bind themselves to accept the lowest or any tender.
Tenders, sealed and endorsed with the name of the Articles tendered for (a sample of which must accompany each tender), to be delivered to J. J. Charnock, Esq., Town Clerk, Town Hall, Wigan, on or before Monday, the 15th of April next.

JOS. TIMMINS,
Engineer.

Gas-Works, Wigan,
March 28, 1895.

CORPORATION OF MANCHESTER.

TENDERS FOR COAL AND CANNEL.

**THE Gas Committee are prepared to** receive, on or before Tuesday, the 30th of April next, OFFERS of High-Class CANNELS and COALS suitable for Gas Making, for delivery at their Gaythorn, Rochdale Road, and Bradford Road Works, during a period of One, Two, or Three Years commencing the 1st of June, 1895.
Particulars and printed Forms of Tender may be obtained on application (in writing only) to Mr. Charles Nickson, Superintendent, Gas Department, Town Hall, Manchester.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
March 29, 1895.

TENDERS FOR COAL.

**THE Directors of the Enniskillen Gas** Company invite TENDERS for the supply of large double-screened GAS COAL, for One or Three Years, at the rate of 1350 tons a year, in lots of 450 tons, to be delivered the second week in March, second week in July, and last week in October each year (the first lot to be delivered October, 1895), free from all liability, to the Gas Company at Enniskillen Stations. Must leave a good Coke, and work out, in practical working, near 10,000 cubic feet per ton of 16-candle Gas.
Payments one month after delivery, as per weight over the Gas Company's Weigh-bridge.
Tenders to be sent in to me by the 30th day of April, 1895.
For further Particulars, apply to

JAMES MALAM,
Chairman.

21, Sefton Street, Southport.

GLASGOW CORPORATION GAS.

TENDERS FOR GASHOLDER.

**THE Committee on Gas Supply and** Electric Lighting of the Glasgow Corporation invite TENDERS for the construction of a GAS-HOLDER, 216 feet diameter, at their Tradeston Gas-Works.
Plans may be seen, and Form of Tender and copy of Specification obtained, at the Engineer's Office, 45, John Street, Glasgow, on payment of Two Guineas.
Sealed offers, marked "Tender for Gasholder," to be addressed to the Subscriber, and lodged with him on or before Tuesday, the 23rd current.
The Committee do not bind themselves to accept the lowest or any tender.

J. D. MARWICK,
Town Clerk.

City Chambers, George Square, Glasgow,
April 4, 1895.

COUNTY BOROUGH OF BURNLEY.

TO TAR DISTILLERS.

**THE Gas Committee of the Corporation** of Burnley invite TENDERS for the purchase of the TAR produced at their Gas-Works during the Twelve Months ending March 25, 1896.
Approximate quantity produced, 3000 tons.
The Tar will be delivered into the Contractor's Boats at the Gas-Works Wharf on the Leeds and Liverpool Canal.
Tenders, under seal, endorsed "Tender for Tar," stating price per ton, to be sent in, addressed to the Chairman of the Gas Committee, Town Clerk's Office, Burnley, on or before Wednesday, the 24th of April, 1895.

By order,
JNO. P. LEATHER,
Gas Engineer.

Gas-Works, Burnley,
April 5, 1895.

KETTERING WATER-WORKS COMPANY.

**THE Directors of the Kettering Water-**Works Company invite TENDERS for the construction of a SERVICE RESERVOIR at their Clover Hill Pumping-Station, Kettering.
Drawings and Specification may be inspected, and Quantities, and Forms of Tender obtained, at the Company's Offices, 4, Newland Street, Kettering, and at the Office of the Engineer, Mr. Thomas Hennell, C.E., 6, Delahay Street, Westminster, London, on and after Monday, the 8th of April.
Tenders, sealed and endorsed "Tender for Reservoir," are to be delivered at the Office of the Company, on or before Noon on Monday, the 22nd of April, 1895.
The Directors will not necessarily accept the lowest or any tender.

By order,
THOS. ALLAMBY SIMPSON,
Secretary and Manager.

Water Office, 4, Newland Street,
Kettering, April 2, 1895.

PONTYPRIDD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

**THE Urban District Council of Ponty-**pridd invite TENDERS for the following:—
CONTRACT No. 6—FIRE-CLAY MATERIALS.
CONTRACT No. 6A.—LABOUR (only) required in the erection of a Retort-Stack.
The Specifications and Drawings may be seen on application to the undersigned, and at the Office of Mr. Thomas Newbigging, C.E., 5, Norfolk Street, Manchester. Quantities may be obtained from the latter on deposit of Two Guineas, which will be returned on a *bonâ-fide* tender being received.
Tenders, endorsed "Gas-Works Contract, No. 6" or "6A," to be sent so as to reach me not later than Monday, the 22nd day of April, 1895.
The Council do not bind themselves to accept the lowest or any tender.

By order,
HENRY LL. GROVER,
Clerk.

Urban District Council Gas Offices,
Pontypridd, April 5, 1895.

TENDERS FOR TAR AND LIQUOR.

**THE Directors of the Victoria Newmarket Gaslight and Coke Company, Limited,** are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works during the ensuing Twelve Months ending the 25th of March, 1896.

Tenders, stating price per 1000 gallons, in Contractor's Tanks or Barrels, free on Rail at Newmarket, to be sent on or before the 25th of April, to the undersigned, from whom any further particulars may be obtained.

The Directors do not bind themselves to accept the highest or any tender.

By order,
J. H. TROUGHTON,
Manager and Secretary.

Gas-Works, Newmarket,
April 3, 1895.

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IMPERIAL CONTINENTAL GAS ASSOCIATION.
INCORPORATED BY ACT OF PARLIAMENT.

**NOTICE is Hereby Given, that the Half-YEARLY ORDINARY GENERAL MEETING** of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Thursday, the 2nd of May next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 31st of December last, and the usual Ordinary Business of such Meeting transacted.

Notice is Hereby also Given, that the TRANSFER BOOKS WILL BE CLOSED from the 18th inst. to the 2nd prox., both days inclusive.

By order of the Board,
G. F. THOMPSON,
Secretary.

21, Austin Friars, London, E.C.,
April 10, 1895.

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**NOTICE.**

TO GAS ENGINEERS AND OTHERS.

**MESSRS. CLAPHAM BROS., Limited,** Keighley, Yorkshire, are no longer authorized to Manufacture my CONDENSER and WASHER-SCRUBBERS.

The above-named Gas Apparatus are erected and giving entire satisfaction at the following places: Neath, Lincoln, Sheffield, Ellesmere, Mountain Ash, Malden, Cullingworth, Montreal (Canada), Woodstock (South Africa), Cape Town (South Africa), &c.

These Appliances can now be obtained solely of the undersigned.

Winchester House, London, E.C. J. A. KELMAN.

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**NOTICE.**

TO GAS ENGINEERS AND OTHERS.

**CLAPHAM BROS., LIMITED,** of Keighley, Yorks., beg to intimate that they are the SOLE MAKERS of LAYCOCK & CLAPHAM'S "ECLIPSE" WASHER-SCRUBBER, and that no person or persons beyond the Patentees and Makers have ever had any interest whatever in the Patent.

They are also the SOLE MAKERS of CLAPHAM'S ATENT IMPROVED "ECLIPSE" CONDENSER, as supplied to Bradford, Manchester, and other Gas-Works.

Orders and Inquiries promptly attended to. See Advertisement in last week's JOURNAL, p. 728.

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**HARCOURT'S COLOUR TEST.**

*For Carbon Bisulphide, Sulphuretted Hydrogen, and Carbonic Acid in Coal Gas.*

The Materials for the above Tests may be obtained from

**Mr. S. E. MILLER, 115, Cowley Road, Oxford.**

---

**ALEXANDER CAMERON,**

*CANNEL & GAS COAL MERCHANT,*

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**GLASGOW.**

---

**LOW MOOR BLACK BED**

**GAS COAL.**

YIELD OF GAS PER TON · 10,375 CUBIC FEET.
ILLUMINATING POWER · 17·50 SPERM CANDLES.
COKE · · · · · · · 75 PER CENT.

Prices, f.o.r. or f.o.b., on application to

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*RAVENS LODGE AND CONYERS' COLLIERIES,*
DEWSBURY.

A TRIAL IS RESPECTFULLY SOLICITED.

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**HOLMSIDE GAS COALS.**

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS:—

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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**SOUTH MOOR PELTON GAS COALS.**

PRESENT DAILY PRODUCE AVAILABLE, 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar . . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

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**HOLMSIDE AND SOUTH MOOR OFFICES,**
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**JOSEPH TAYLOR & CO.,**
**Central Plumbing Works, Town Hall Square, BOLTON.**

Practical Makers of all kinds of Saturators, and Specialists in every description of Lead Work required in connection with Sulphate Plants.

*Special attention to Repairs.*

**Improved Lead-Burning Machines, Sulphate Bagging Machines, Copper Scoops, &c.**

HIGHEST REFERENCES ON APPLICATION.

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**REAL SILKSTONE GAS COAL**

ANALYSIS AND PRICES ON APPLICATION.

**T. B. KITTEL, SHEFFIELD.**

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**HEBBURN MAIN GAS COALS.**

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

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W. RICHARDSON, Fitter.

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**BLACK BED GAS COAL.**

*Prices and Analysis on application.*

**MIRFIELD (GAS-COAL) COLLIERY COMPY.**
**RAVENSTHORPE, NEAR DEWSBURY.**

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**TYNE**
**BOGHEAD CANNEL.**

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

**EAST PONTOP GAS COAL.**

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

**SOUTH PELAW MAIN GAS COAL.**

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

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**—1892-3.—**

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**BEST QUALITY.**

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[See Illustrated Advertisement, April 2, p. 728.]

# COKE BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT.)

*New Design, with two Cutting Rollers, making less Breeze than their old pattern.*

**GEORGE WALLER & CO.,**
PARK STREET, SOUTHWARK, E.C.,
*And at STROUD, GLOUCESTERSHIRE.*

# THE SILICA FIRE-BRICK COMPANY,

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MANUFACTURE

## SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

**FOR GAS-FURNACES.**

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

# KENT'S THICK GAS COAL

RAISED AT

## The Wharncliffe Woodmoor Colliery, BARNSLEY.

*Yield of Gas, nearly* 12,000 *Cubic Feet per ton of Coal; and Illuminating Power nearly* 17½ *Candles.*

*The following is a complete ANALYSIS made by Mr. R. O. PATERSON, C.E., Gas-Works, Cheltenham:—*

| | |
|---|---|
| Specific Gravity (Water 1) | 1·276 |
| Weight of One Cubic Foot | 79·700 lbs. |

PROXIMATE ANALYSIS.

| | |
|---|---|
| Moisture in Coal | 2·68 per cent. |
| Volatile Matter | 35·60 ,, |
| Fixed Carbon | 58·80 ,, |
| Sulphur | 0·96 ,, |
| Ash | 1·96 ,, |

COMMERCIAL ANALYSIS.

| | |
|---|---|
| Gas per Ton of Coal | 11,760 cub. feet. |
| Gas per Cubic Foot of Coal | 418 ,, |
| Illuminating Power | 17·44 candles. |
| Value of One Cubic Foot in Sperm | 418 grains. |
| Value per Ton of Coal in Sperm | 703 lbs. |
| Coke per Ton of Coal | 1367 ,, |
| Coke | 61·05 per cent. |
| Ash in Coke | 3·21 ,, |
| Sulphur Eliminated with Volatile Products per Ton of Coal | 9·4 lbs. |
| Sulphur in Coke per Ton of Coal | 12 ,, |
| Ammoniacal Liquor per Ton of Coal | 19·7 galls. |
| Tar per Ton of Coal | 12·2 ,, |

R. O. PATERSON, C.E.

*Gas-Works, Cheltenham,*
*8th August,* 1894.

**For Price, &c., apply to the**

## Wharncliffe Woodmoor Colliery Co LIMITED,

BARNSLEY;

*Or to* **Mr. W. H. HARVEY,**
**17, Old Queen Street, Westminster, S.W.**

# PIPES, 2-in. to 8-in. PIPES, 2-in. to 8-in. PIPES.

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FOR THE ERECTION OF COMPLETE GAS AND WATER WORKS, AND FOR RENEWALS AND EXTENSIONS OF EVERY DESCRIPTION.
PLANS & ESTIMATES ON APPLICATION.
MAIN LAYING AND RETORT SETTING.

# BOLDON GAS COALS.

## Worked by THE HARTON COAL CO., LTD.

**Output about 3000 tons per day.**

ANALYSIS—

| | |
|---|---|
| Yield of Gas per ton | 10,500 Cubic Feet. |
| Illuminating Power | 16·9 Candles. |
| Coke | 66·7 Coke. |
| Sulphur | 0·86 Sulphur. |
| Ash | 2·04 Ash. |

**Boldon Gas Coals are supplied under contract to**

The Gaslight and Coke Company, South Metropolitan Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Bombay Gas Company, San Paulo Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

**For prices, &c., apply to the**

## HARTON COAL COMPANY, LIMITED,

**Newcastle-on-Tyne.**
W. H. PARKINSON,
FITTER.

# THORNLEY GAS COALS

WORKED BY THE

## WEARDALE IRON AND COAL COMPANY, Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

**The Analysis made by Messrs. J. and H. T. Pattinson, Public Analysts for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a Working Analysis made of these Coals by the Tudhoe and Sunderland Bridge Gas Company:—**

[COPY.]

TUDHOE AND SUNDERLAND BRIDGE GAS COMPANY.
*Tudhoe Gas-Works,*
*Spennymoor,*
*6th June, 1893.*

Messrs. The

## WEARDALE IRON & COAL COMPANY, LTD.

GENTLEMEN,

For the last two months we have used your **THORNLEY GAS COAL** exclusively at these gas-works; and I have pleasure in herewith giving you the actual results obtained during the trial.

Yield of Gas per ton: 10,300 cubic feet.
Yield of Coke: 13½ cwt.
**Illuminating Power of Gas,** average of a series of tests, **17 Sperm Candles.**
The Coke was of excellent quality.
**The following is a complete ultimate Analysis of the Coal.**

| | Per Cent. |
|---|---|
| Carbon | 83·128 |
| Hydrogen | 5·116 |
| Oxygen | 7·401 |
| Nitrogen | 0·585 |
| Sulphur | 0·620 |
| Ash | 3·130 |
| Water | 0·020 |
| | 100·000 |

**Analysis of the Coke.**

| | |
|---|---|
| Carbon | 93·31 |
| Sulphur | 0·61 |
| Ash | 5·00 |
| Moisture | 1·08 |
| | 100·00 |

I am, Gentlemen,
Yours truly,
A. B. COWAN,
Manager.

**For Price, &c., apply to the**

## WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

**NEWBATTLE CANNEL.**

Highest Results in Gas, & Excellent Coke.

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**DALKEITH, N.B.**

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Complete Automatic Coal-Stores, Retort-Houses, and Coke Yards.

Retort Mouth-pieces and Furnace Fittings.

**LABORLESS WORK In 1895.**

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Making preparations to adopt

SELF-ACTING SYSTEMS OF CARBONIZING

In 1895,

*are cordially invited to call and inspect our latest Designs of Automatic Coal and Coke Handling and Charging Machinery.*

We send skilled Draughtsmen to get Particulars for Detail Plans.

Address:—

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**FIRE-CLAY & BRICK WORKS,**

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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

**LONDONDERRY GAS COALS**

FROM THE

**MARQUIS OF LONDONDERRY'S COLLIERIES,**

**COUNTY OF DURHAM.**

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

**S. J. DITCHFIELD,**

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ALL COMMUNICATIONS RESPECTING THE

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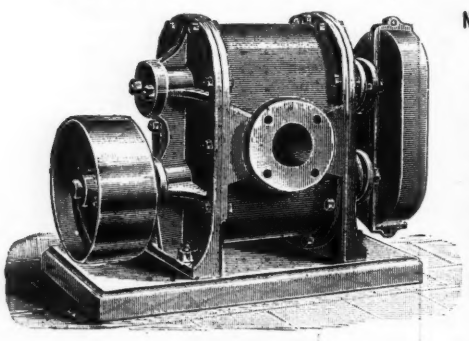
**The Pump of the future for quickly and economically moving large bodies of Water, Semi-Fluids, &c.**

The force of the Piston Pump with the capacity of the Centrifugal combined.

NO SLIDES OR FRICTIONAL WORKING PARTS.



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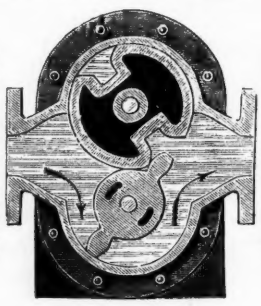

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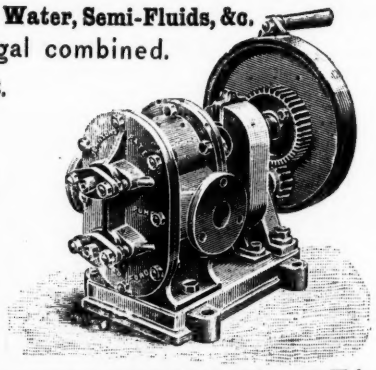

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# HEATHCOTE GAS COAL.

RICH IN ILLUMINATING POWER AND YIELD OF GAS.
ABOVE THE AVERAGE IN WEIGHT AND QUALITY OF COKE.
MAINTAINS A HIGH STANDARD IN RESIDUALS.

## THE GRASSMOOR Co., Ld., CHESTERFIELD

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Manufacture & supply best quality of
**Gas Retorts** (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.
*EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.*
Contractors for the erection of Retort-Benches complete.

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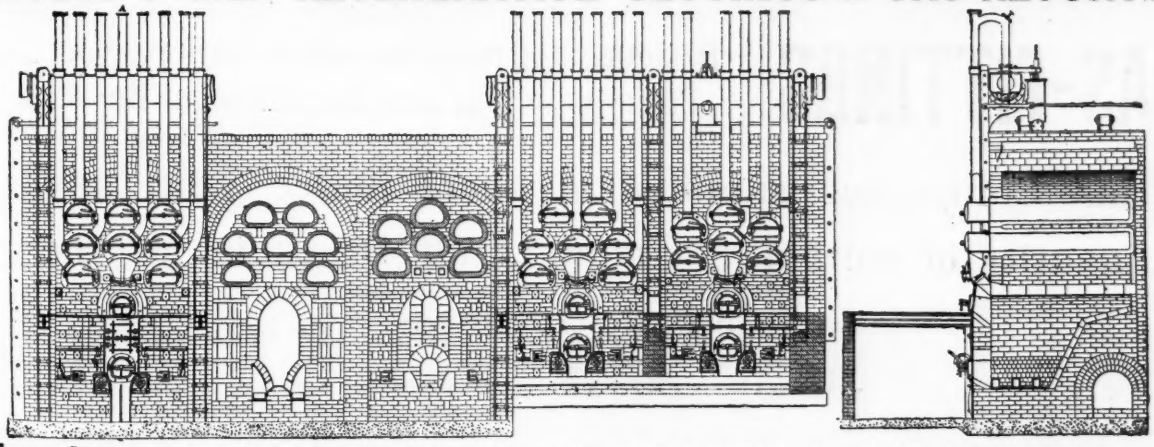
## HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS, CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON,** Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON,** Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

## HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non*

TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.

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Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.
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Gas Companies supplied at short notice with any quantity of suitable Pendants and Brackets for the Automatic Business.

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WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

## MACHINE-MADE GAS-RETORTS.

# GAS AND WATER PIPES

AND

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MANUFACTURED BY THE

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## Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

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| DUKINFIELD. | DARWEN. | BOURNEMOUTH. |
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Rich in Illuminating Power and Quantity of Gas and Residuals.

## CRAWSHAW AND WARBURTON,

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ALSO THE LARGEST METAL TANK IN THE WORLD
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MAKERS OF RETORT-LIDS OF ALL FORMS & SHAPES BY SPECIAL HYDRAULIC MACHINERY

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**INCLINED RETORT-SETTINGS,** with or without Gaseous Firing.

**RETORT-SETTINGS** of exceptional Merit for Works on Wet Soils.

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**AND GAS AND WATER WORK, INCLUDING MAIN LAYING.**

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# Sulphate of Ammonia Plant

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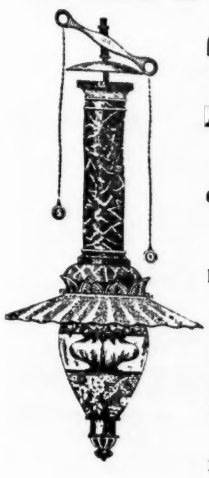

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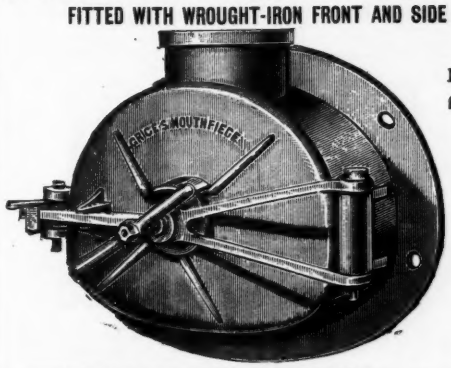


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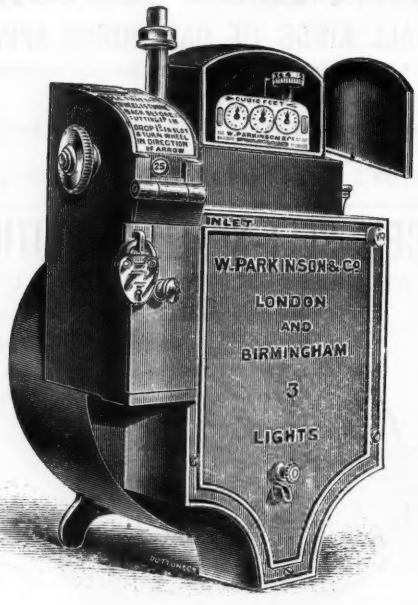

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DROP PENNY IN THE SLOT AND TURN WHEEL IN DIRECTION OF ARROW TILL THE PENNY DROPS
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See also Advt. p. 738.


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